Senior executives and their individual use of computers (a study of the continuity, level and extent of senior executives' use of computers for personal support)

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Submitted by Monica E. Seeley
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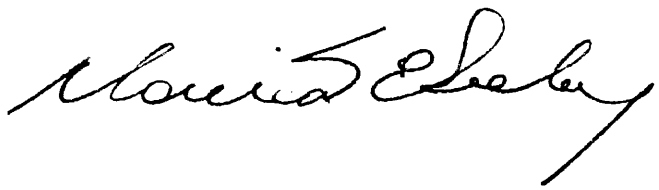

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This thesis is dedicated to my mother.

"All these years, you have been the object of my love and gratitude,
frustration and pain, blame and compassion."
(Motherhood: The Second Oldest Profession, Erma Bombeck, 1983)

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Abstract

This thesis describes a study of senior executives in large UK based organisations (FT Top 150 or equivalent) and the continuity, level, and extent to which they used computers to support themselves in their work as senior executives. The research design was based on Grounded Theory and process methodologies. The data were collected through interviews which were subsequently analysed using qualitative methodologies. Executives were asked to complete the Myers-Briggs Type Inventory. The latter was used to support the interpretation of the interview data and highlight relevant personality attributes.

Four distinct patterns of use were identified: steady state use where an executive had acquired a certain level of use, be it low or high, and remained at this level for some time; declining use, where the level and extent of use had declined over a period of time; born again use, where use had declined but had been re-instated; and growing use, where the executive was still developing his competence. The processes related to each path were explicated.

The majority of executives had taught themselves to use the computer and saw learning as an investment. The use they made of the computers was therefore related to the payback they perceived in terms of this investment and the value to them in their chosen role. Executives were found to use computers to support themselves in an extensive range of managerial roles, including informational, decisional and interpersonal roles.

The overall use executives made of the computer was related primarily to how they perceived their role and their personal preferences for conducting themselves as executives. For those who made the most use of computers, their use had become an integral part their *modus operandi*. Based on the results of this study a punctuated equilibrium model of executive end-user computing is proposed.

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CHAPTER 1 - Background to this Research

This chapter describes the rationale, philosophy and ideology which both drove and underpinned this research. It outlines the goals, research methodology and processes for the research. The principles used to guide the literature review and the subsequent selection of sources of data, and a description of the structure of this thesis are covered in this chapter.

1.1 Introduction

1.1.1 The Changing Technological Landscape

In 1958 Leavitt and Whisler (1958) in their seminal article predicted that information technology (IT), and in particular the computer, would influence the content of managers' work at all levels of the managerial hierarchy. Over the past two decades there have been several landmark publications which have promulgated this view, and especially with respect to the work of senior executives (for example, Applegate *et al.*, 1988; Boone, 1991; Keen, 1991; March and Sproull, 1990; Rockart and DeLong, 1988; Rockart and Treacy, 1982; Scott Morton, 1991; Zuboff, 1988).

The power, capacity and accessibility of the computer have increased dramatically since Leavitt and Whisler's (1958) predictions. Many of the most significant changes have taken place during the last five to ten years with the advent of the graphical user interface and the availability of small stand-alone computers which have substantially more processing power than their mainframe predecessors (Haynes, 1994). Pentium-based personal computer (PC) chips can process data at roughly 300 times the speed of the original IBM PC and offer 1,000 times as much processing power per dollar as an IBM mainframe of the mid-1980s (Haynes, 1994). Based on a survey of 1,000 IT executives who represented organisations with 500 to over 5,000 employees, Price Waterhouse (1995) found that the average IT budget for 1995/6 was estimated to be £5.73 million. On average, one fifth of the total budget is spent on 'users' who are outside the corporate MIS department. Hardware accounts for 27% of the budget and represented the single largest item of spend. The ratio of spend on PCs to mainframes was 49:50. It is not clear how the 'user' spend is broken down in terms of hardware, software, and support such as training. Nonetheless, the figure of £5.73 million gives some idea of the level of spend on end-users. The

Gartner Group (1995) estimates that although the capital cost of a PC has fallen by about 10%, the five year cost of PC ownership has risen from about £10,857 to as much as £25,000 today. The increase is attributed mainly to the higher level of labour needed to install and maintain Windows and network based systems compared to stand-alone DOS systems. Labour represents 88% of the total costs which comprise 14% 'technical support' (eg., training the IT professional help and desk facilities), 17% 'administration' (eg., file management) and 57% 'end-user' costs (eg., training and applications development for 'end-users').

Senior executives are constantly being told how information technology is the key to corporate success, and there are many well-reported instances of IT being used successfully to gain significant business benefits (for example, Clemons, 1991; Earl, 1989; Keen, 1991; Mahmood, 1993; Scott Morton, 1991). However, senior executives may also have seen studies reporting poor returns of IT investment (Clemons, 1991; Hackett, 1990; Loveman, 1988). It has been suggested that one of the main reasons why senior executives do not perceive a return on their IT investment is their lack of personal involvement with, and awareness of, IT and its role (Benjamin *et al.*, 1984; Keen, 1991).

1.1.2 Senior Executives' Personal Interactions With Computers

Mintzberg (1973) showed that senior executives are required to perform at least nine different roles, which he grouped into three sets, the interpersonal, the informational and the decisional roles, with the latter being seen as the most important for senior executives. Each set involves some element of processing, managing and communicating information. Prahalad and Hamel (1990) in their seminal paper on core competences allude to the importance of managing and communicating information which organisations and the individuals therein need, in order to improve their productivity. Bartlett and Ghoshal (1994; 1995), Handy (1994); Herriot and Pemberton (1995); and Mitroff and Linstrone (1993) in recent publications suggest that to survive in the 21st century, managers will need to go outside traditional ways of thinking and problem solving. Handy (1992; 1994) and Katzenbach and Smith (1993) amongst others advocate that there will be an increasing emphasis on team-work, and that the members of the team may be from multiple disciplines, geographically dispersed, and maybe even operate as 'virtual corporations' (Davidow and Malone, 1992). These and other authors (such as Fulk and DeSanctis, 1995; Fulk and Steinfield, 1990) suggest that one of the primary keys to these new ways of working lies in the use, communication and management of information. Information, it is

suggested, will be the dominant currency and in turn, the most valuable asset of managers and their organisations (eg., Drucker, 1991; Herriot, 1992; Handy, 1994). Information communication and communications technology, and in particular the PC, can provide executives with a powerful tool for handling and managing their information needs (Boone, 1991).

Nonetheless, whilst senior executives are responsible for investing significant resources in information technology for the organisation, the extent to which they accept and use the computer themselves, and hence its impact on how they operate, is in reality debatable (Bird, 1991; 1992; Nelson, 1989; March and Sproull, 1990). Some authors do advocate that senior executives should not even be concerned with the use of the technology but rather its deployment (Ackoff, 1967; Earl, 1989; Scott Morton, 1991). This is, however, in stark contrast to the school of management emulated by Kanter (1992), who has consistently advocated that what the chief executive officer and his management team does sends out the strongest message to the rest of the organisation about what is acceptable behaviour, whether dealing with either IT or other areas.

There are a number of factors which are known to influence the use of the PC and which fall broadly into five categories, the technological environment, the organisational culture, the individual, the manager's job and role, and the available tools and support (Fisher, 1992). These are discussed in detail in Chapter 2. Of all these many factors, not surprisingly the role model demonstrated by senior executives has been shown to be one of the most important and influential factors in determining the level of success an IT project achieves (for example, Cheney and Dickenson, 1982; Cheney *et al.*, 1986; DeLone, 1988; Earl, 1989; 1990; Ein-Dor and Segev, 1988; 1991; Keen, 1991; Rockart and DeLong, 1988; Schein, 1992b; Schultz and Slevin, 1975). There are many frameworks which guide senior managers about how to deploy their IT resources to gain strategic business benefits (for example, Cash *et al.*, 1992; Earl, 1989; 1990; Keen, 1981; Porter and Millar, 1985; Scott Morton, 1991).

There is an extensive body of literature on the use of computers by middle and junior managers and professionals which is commonly termed end-user computing, which will be reviewed in Chapter 2. Few of the studies focus exclusively on senior executives and their needs and uses. Of the studies which have been undertaken the majority have focused on the use of 'Executive Information Systems' (EIS), which are primarily designed to support executives performing their decisional roles. (For a representative sample of this literature,

see Bergeron *et al.*, 1995; Boone, 1991; Elam and Leidner, 1995; Nord and Nord, 1995; Rainer and Watson, 1995; Rockart and DeLong, 1988; Vandenbosch and Higgins, 1995a; 1995b; Watson *et al.*, 1992.) However, as indicated, the decisional roles are only one of the sets of roles which executives perform (Mintzberg, 1973).

There are several well documented frameworks which show the stages of growth one might expect for personal computing from an organisational perspective (for example, Cash *et al.*, 1992; Galletta and Hufnagel, 1992; Gibson and Nolan, 1974; Gorry and Scott Morton, 1989; Henderson and Treacy, 1986; Nolan, 1973; 1979), but far less is known about individuals' patterns of use over time. Is it reasonable to expect that individuals also move through some clearly defined growth path? What factors enable some end-users to develop their competence but inhibit others such that they do not progress past the beginner's stage?

Martin (1986; 1988), in one of the few studies which focused exclusively on senior executives, found that whilst some did use their computers many stopped using it after a short while. Ein-Dor and Segev (1991) also noted a pattern of discontinuous use amongst middle managers. In both cases, this discontinuous use was despite the fact that the managers had put in considerable time and effort to learn to use their systems. Martin (1988) took the case history approach and studied the use of Decision Support Systems (DSS) in four contrasting organisations. He found considerable differences in the intensity of use of systems even though individual managers had received the same initial level of training, support and resources.

As March and Sproull (1990) have already noted, given the resources (time and money) most organisations invest in their IT systems and particularly the PC, and the influence that senior executives have on the utilisation of IT, it is not unreasonable to suggest that we should understand more about the use these executives make of IT themselves. Conversely, it could be argued that in fact senior executives do not warrant special attention, especially given that they form only a small percentage of the total population of managers. However, there are a number of factors which differentiate the environment of the senior executive from that of his middle and junior counterparts.

Perhaps one of the most fundamental differentiators is that as a result of their position in the organisation, senior executives have discretion about how they perform their work, which is not usually available to lower levels of management

(Fox, 1980; Stewart, 1982; 1991), and hence a choice as to whether or not they use the computer at the personal level. As a direct consequence they are in a position to push for computers rather than be pulled along, the latter being the case at lower levels. Moreover, in many cases, if a senior executive chooses not to become a direct user he is able to call upon someone else to drive the systems and becomes what Culnan (1983) calls a 'chauffeured end-user'.

Whilst there is contradictory evidence as to the content and nature of the kind of work managers do at different levels, there is considerable evidence that the orientation and information needs differ at different levels (Anthony, 1965; Kotter, 1982; Mintzberg, 1973; 1989; Stewart, 1967; 1982). Mintzberg (1973) found that in comparison to lower levels of executives, senior executives spend more time outside the organisation; are more focused on external issues; collect and use a wider range of information; are less concerned with current specific issues and more concerned with the longer term wider strategic issues; and have more elastic and longer decision making time frames. Kotter (1982) and Mintzberg (1973) also found that senior managers' internal channels of communication often do not coincide with their formal lines of authority.

Grindley (1991; 1992) argues there is a generation gap as it is often the older generation of executives who are reluctant to accept and use computers. He suggests it is a transient problem which time will erode, as the next generation of executives will be computer literate and more positively disposed towards IT. However, it is the senior executives of today who are setting the strategy of their organisations for the future, and as Kanter (1992) points out, how the organisation should behave. One could therefore argue that if these senior executives do not understand and exploit fully the potential of IT they may not be including it in their vision of the future. Furthermore, whilst the younger executive may be very adept with computers, this begs the question of whether they can judge when it is appropriate to use one? Lee (1986) specifically notes that although the younger managers in his study used the PC for longer than the older managers, there was no evidence that this extended use led to any gains in productivity.

1.1.3 Research Methodology

Most of the studies to date on end-user computing have not unnaturally focused on mainframe management information systems (MIS) and managers further down the organisation. With the growth and accessibility of the PC there is a

need to understand which factors influence their use. Are there differences between the PC and the mainframe MIS? One would expect some differences purely as a result of the difference in the interface and the more personal nature of the PC. There have been studies which have investigated the utilisation of the PC (eg., Igbaria, 1993; Lee, 1986; Mason and Willcocks, 1991; Mawhinney and Lederer, 1990; Thompson *et al.*, 1991; 1994), but again there is little about the senior executive. Implicit in most studies too is the notion that, regardless of status, those being observed are users. Few studies, of which Martin (1986; 1988) and Culnan (1983) are notable exceptions, have paid much attention to the non-users and why it is they do not make use of the PC.

Hamilton and Ives (1982) found that of the studies which have been conducted on end-users, not just on senior managers but on all levels of managers, the largest proportion have been undertaken using qualitative research methodologies. More recent articles by Galliers (1993) and Walsham (1991; 1995a) indicate that this is still where the emphasis lies and in particular on survey techniques (Grover *et al.*, 1993). There has also been a tendency to focus on the influence of variables rather than process (Newman and Robey, 1992; Orlikowski and Baroudi, 1991). This emphasis on variables, especially when undertaken from a quantitative approach, firstly assumes a rational view of man which, as March and Simon (1958) and Mason and Mitroff (1973) said, may not be justified and often does not allow the researcher to take adequate account of the contextual issues (Mason and Mitroff, 1973; Markus and Robey, 1988; Schultz and Slevin, 1975). Secondly, it does not always allow one to take account of the dynamic nature of the relation between man and the technology (Fulk *et al.*, 1990; Goodman *et al.*, 1990; Newman and Sabherwal, 1996; Sabherwal and Robey, 1995; Weick, 1990b). Thirdly, information technology is heterogeneous rather than homogeneous (Goodman *et al.*, 1990), and again the quantitative positive approach may not allow the research to take adequate account of this heterogeneous interaction.

The focus on variables rather than process may also account for why so many studies in the field of MIS appear inconsistent and at times contradictory (Newman and Robey, 1992; Orlikowski, 1993). An interpretivist style of research derived from, for example, the principles of Grounded Theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990) and process methodologies (Mohr, 1982) provides the opportunity to explore the unknown and develop theories and frameworks which might otherwise remain opaque to the purely quantitative researcher who relies solely on an empirical positivist approach.

1.2 Origins of this Research

For the past two decades this researcher has been involved with information technology and has been interested in why two people, who on first sight have identical roles, will make quite different and sometimes opposing use of computers and in particular the PC (Seeley, 1983). Despite significant improvements in the capability and accessibility of the PC to the professional worker since the birth of the PDP 11 in 1970, which was the forerunner of today's networked PC environment, and the plethora of learned articles written about how to manage technological innovations the PC has still been adopted by only a small proportion of senior executives (Bird, 1991; Nelson, 1989). As Thompson *et al.*, (1991) pointed out, whilst organisations continue to invest heavily in PCs we know very little about what factors affect their utilisation. Moreover, when 'use is optional, however, having access to the technology by no means ensures it will be used or used effectively' Thompson *et al.*, (1991, p 125).

This researcher spends most of her working life educating senior managers about the role of information technology as a tool to improve both personal and organisational effectiveness. In a group of twenty executives it would not be unreasonable to expect participants' knowledge about IT to be distributed around a normal bell shaped standard distribution curve with a few at each end of the curve knowing either very little or a lot. Repeatedly, however, the pattern is of two disproportionate peaks, one of which represents the few who know a great deal about IT, are keen to know more and often profess to using it quite extensively. The other larger peak represents the greater proportion, who know little, and are often disinclined to take much interest in IT (Seeley, 1991).

This researcher's interest has never been with the technological issues but with the user who is an individual with his own personality and predispositions operating in the complex social and psychological context of an organisation (Katz and Kahn, 1978; Weick, 1979) and trying to balance his personal needs against those of the organisation (Herriot, 1992). The situation is aptly summed up by Geertz (1973, p.5): 'man is an animal suspended in webs of significance he himself has spun'. It is the human, social and psychological issues and their interrelationship which are related to change brought about by innovation (Gross *et al.*, 1971) which are of interest to this researcher, as exemplified by the landmark study of Zuboff (1988). These are facets of the use of information technology and in particular the PC which do not lend themselves readily to empirical methods of quantitative research (Mason and Mitroff, 1973). The work of Gross *et al.*, (1971)

and especially that of Zuboff (1988), has had a significant influence on this researcher's philosophy with respect to senior executives' personal interactions with computers.

1.3 The Research Problem

As outlined in Sections 1.1.1 and 1.1.2, whilst there is a significant body of research available about the factors which influence middle and junior managers to use computers, far less is known about the senior managers and especially their personal use of the computer to support them in roles other than the decisional ones. The goal of this research was to investigate how senior executives are personally using computers (and specifically the PC) to support them in their total work as senior executives. In particular this research set out to explore whether or not there is a growth path and learning curve associated with senior executives' use of the PC, what shape it takes (linear, discontinuous, etc), and what episodes and encounters act as enablers and inhibitors to progression through the path. Of specific interest were the following questions:

- What factors initially influenced executives to use the computer?
- How has their use of the computer changed over time?
- What factors have influenced these changes?
- How have they developed their expertise with computers?
- What benefits and disadvantages do they perceive in personally using the computer?
- Has their *modus operandi* changed as a result of using the computer?
- What factors deterred executives from making more direct personal use of the computer?

To explore why executives use the computer does not necessarily tell us why those who do not, make such a choice. Therefore, this study also set out to make a deliberate attempt to explore why some executives make no personal use of the computer and to compare the non-users with the users in an endeavour to understand further what inhibits some executives from making direct use of the computer.

This research builds on the existing research studies into both end-user computing per se and that which is specific to senior executives, and in particular EIS. The emphasis of this research is on identifying and hence determining what are the issues which relate to senior executives' personal

interactions with computers rather than testing a specific hypothesis. This approach was chosen because it was perceived firstly, that the factors which influence senior executives' personal use of PCs are not fully understood, and for the reasons outlined in Section 1.1.2 and expanded upon in Chapter 3. As March and Sproull (1990) suggest, more adequate theories are needed to cope with, and accommodate the complex interactions and multiple interdependencies related to executives' use of computers. Secondly, to undertake a quantitative survey based study would be inappropriate for this subject matter, for the reasons outlined in Section 1.1.3 and expanded upon in Chapter 4.

Therefore this study adopts primarily a qualitative interpretist approach, as exemplified by Zuboff (1988), using research methodology which has its roots in Grounded Theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990) and the process methodology of Mohr (1982) and is exemplified by the work of Newman and Robey (1992) and Orlikowski (1993). It is a study about 'sensemaking' (Weick, 1979; 1990b; 1995).

1.4 Definitions and Terminology

There are four terms which need defining before proceeding - senior executive, information technology, management information systems and end-user - as each is open to many different interpretations.

1.4.1 Senior Executive

There are many schools of thought about the content and nature of the senior executive's job (eg., Anthony, 1965; Barnard, 1938; Drucker, 1979; Fayol, 1949; Kotter, 1982; Mangham and Pye, 1991; March and Simon, 1958; Mintzberg, 1973; 1989; Sayles, 1964; Stewart, 1967; 1982; 1991) and these are reviewed in Chapter 4. Regardless of the school of thought one adopts, the emphasis managers place on the tasks and nature of their managerial responsibilities will vary from organisation to organisation, and between the functions therein (Mintzberg, 1973; Stewart, 1982: 1991). Moreover, at this stage the issue is not which school of thought to adopt but rather how to choose senior executives who are indeed senior, for as other previous researchers found (Martin, 1986) the terms associated with seniority, such as director and general manager, tend to be used rather liberally. Consequently, as other previous researchers concerned with the senior echelons of management have

found, titles alone are not a sufficient indication of executives' seniority (Fisher, 1992; Martin, 1986).

Many managers have power and authority by virtue of their perceived leadership qualities, but this does not necessarily equate with seniority (Katz and Kahn, 1978). There is a need to define the term senior in some way which is unambiguous, leaves as little room as possible for subjective interpretation, and enables the researcher to operationalise it.

Martin (1986) looked at large and small organisations and was concerned primarily with the decision-making aspect of the senior manager's work. He suggests one must distinguish between role and decisional behaviour. He narrowed his definition of the term 'senior' down to positional seniority and two proxy measures of the manager's resource allocation authority - annual spending and the number of employees for whom the manager was responsible - and therefore only included board members. In taking this approach he acknowledges that it may mean excluding some senior managers who are not on the board but are in a position of influence and some board members with a specialist brief but are not involved in the strategic decision making process.

With the changing nature and structure and shape of organisations (Davidow and Malone, 1992; Drucker, 1993; Handy, 1992; Kanter *et al.*, 1992), this exclusion may not be appropriate. In a 'federal organisation' (Handy, 1992, p. 60) there are likely to be senior executives who are responsible for determining the strategic direction of their organisation but may not be responsible for many employees. The emphasis on teamwork may lead to roles of seniority akin to that of 'conductor' (Drucker, 1993, p. 93) where again the executive is responsible for the strategic direction of the organisation but may not be directly managing many other employees.

Fisher (1992) was guided by Anthony (1965) who outlines three levels of managerial work:

- strategic planning - setting the goals and objectives and how resources are deployed;
- management control - implementing the strategies, making sure the resources are available and used effectively and efficiently;

- operational control - ensuring that specific tasks are carried out effectively and efficiently.

In terms of his pyramidal management hierarchy Anthony (1965) suggests that managers at the top of the pyramid are mostly concerned with strategic planning, although they may perform many roles (Mintzberg, 1973) and tasks (Stewart, 1967; Kotter 1982). Those in the middle are concerned to some extent with planning and organising, but more generally they are focused on control related tasks. Those at the bottom and who comprise the majority of managers are concerned primarily with day to day operational control issues.

Others, such as McKinnon and Bruns (1992) and Vandenbosch and Higgins (1996) have selected their senior executives on the basis of their position below either the CEO or president.

Based on Anthony's (1965) model, and the experiences of previous researchers (such as Fisher, 1992; Herriot, 1993; Martin, 1986) and the need to take account of the changing shape of organisations, for the purpose of this study, a senior executive is defined as 'an executive who is concerned with the strategic direction of their organisation's business' and in particular:

- is in a position to influence significantly the strategic decision-making processes for their function and/or the organisation;
- has substantial control and authority over how resources are deployed;
- is in a position to influence the strategic direction of the business of their function/organisation;
- may have other senior managers reporting to him.

Although this definition is very close to that of Martin (1986), it does allow for the inclusion of the senior executive who may therefore be responsible for specific projects but may not be responsible for many other employees. In essence, therefore, the focus of this research is on managers at the top level of Anthony's (1965) hierarchy, which in practical terms means board level or one or two levels below.

1.4.2 Information Technology (IT)

Information technology (IT) is taken to be any computer based technology which supports the storage, processing, communication and manipulation of data and

information. In the context of this study the main focus is on information technology more appropriate for use at a personal level and in particular the personal and desktop computer. No distinction is made, unless relevant, between the different types of PCs, such as the desktop and laptop. Each is referred to generically as a personal computer (PC). Hand-held devices referred to variously as personal digital assistants, personal organisers and palmtop computers, will be referred to as electronic personal organisers.

1.4.3 Management Information Systems (MIS)

The terms Management Information Systems (MIS), Information System (IS), and Information Technology (IT) are often used interchangeably. For consistency and ease of reading, the term MIS will be used as the generic term to refer to the field of study, and profession and function as a whole.

1.4.3 End-User

There are many definitions of the term end-user which range from those which include the MIS professional to those which specifically exclude the latter (for example, Amoroso, 1992; Cotterman and Kumar, 1989; Davis and Olson, 1985; Ein-Dor and Segev, 1988; Kraemer *et al.*, 1993; Martin, 1985; McLean, 1979; Rainer and Harrison, 1993; Rockart and Flannery, 1983; Yaverbaum, 1988). For the purpose of this study Yaverbaum's (1988, p. 76) definition of an end-user is used, namely 'any member of an organisation who interacts with computer systems, but who is not employed as a programmer or systems analyst'. Based on the work of Ein-Dor and Segev (1988) and Yaverbaum (1988) usage is taken to encompass the whole range of activities from simply using computer output to developing an application. Those who use computer generated output only in paper form as opposed to accessing it directly on line are regarded as non-users.

1.5 Sources of Data

This study is based on two sources of data, primary and secondary data. The primary data was gathered directly by this researcher from interviews with senior executives and the use of the Myers-Briggs Type Inventory (MBTI) which assesses certain Jungian personality traits (Myers, 1962). The source of the secondary data was the literature and previous studies which were used to guide and inform this research.

1.5.1 Primary Sources of Data - Composition of the Sample Studied

The purpose of this section is to give the reader a clear and concise overview of the composition of the sample studied and the data collection techniques used. The reasons why these were chosen and especially the latter are discussed in detail in Chapter 4, and their characteristics are given in Chapter 5.

Porter and Millar (1985) argue that the nature of an organisation's business will have an influence on the way members of the organisation use IT in view of their different information needs. Schein (1994) found that an organisation's culture can influence the use it makes of IT at the organisational level. Other authors have found variations in the organisational use of IT which relate to contextual factors such as the organisation's size, and turnover (for example, Ein-Dor and Segev, 1978; 1988; Lind *et al.*, 1989). At the individual level of use Ein-Dor and Segev (1991) found that organisational culture was not a significant factor.

Following the guidelines of Feeny *et al.*, (1992) to try to assume away any organisational and functional effects which may be present it was decided to select organisations and functions within those organisations, with different information intensities. Similarly, organisations with different management cultures were chosen (for example, bureaucratic and matrix management styles (Handy, 1981)).

The executives within the organisations were also chosen so as to provide a cross-section of computer usage across the total sample, from those who made no use, to those who made extensive use of the computer. Organisations and the executives therein were therefore selected to provide a stratified rather than random sample.

There were two main options regarding sample size:

1. Many organisations, say up to twenty, but fewer interviewees within each, say five to seven.

2. Fewer organisations, say seven to ten, but with a broader range of interviewees, say up to twenty.

To achieve a good spread of users across organisations and functions option one is preferred, ie., many organisations with fewer interviewees. A target was set of

100 senior executives from about twenty organisations. Additionally it was thought that other members of the chosen organisations would need to be interviewed to provide background information. For example, the personnel officer (for information on the training policy in general); and the IT manager (to provide background information about the IT policy). Only large organisations (Times Top 150 or equivalent) were selected, as it was envisaged that smaller companies would not have the range of end-users needed.

Using the Financial Times 'FT 500' 1994 annual survey of Europe's top companies, a list of about 30 potential commercial UK companies was identified which represented organisations with different information intensities (for example, banks which it is reasonable to assume are more information intense than building and construction companies). Two government agencies and five other organisations were also identified as possible participants. Of the five other organisations, although three have their corporate head offices outside the UK they are amongst the top 25 companies within their country of origin, and this researcher had contacts within the UK head office. Two were mutual societies and not quoted on any of the international stock markets. A group of organisations was thus identified who it was hoped provide a spread of different organisational cultures along the lines discussed. Not unexpectedly, only about fifty percent of the organisations initially identified were able to participate and a second round of potential participants was identified. The second round of selections was made on the basis of trying to find organisations which reflected cultures not already represented by the existing participants. The exact procedure for selecting the organisations and executives therein and the realities of gaining commitment are discussed in detail in Section 4.4.

103 executives were studied from 18 different organisations, as summarised in Table 5.1. In reality only 85 of the executives were deemed to be truly senior using the guidelines laid down in Section 1.4.1, and the two mutual organisations were deemed not to fit the organisational criteria (of being Times Top 150 and equivalent). The body of the study and hence data analysis is therefore based on a sample of 85 senior executives which was drawn from 16 different organisations.

1.5.2 Secondary Data Sources - The Literature

A study such as this is by its very nature multi-disciplinary and needs to draw on the literature of several related fields, and in particular, management, management information systems, organisational theory, psychology, philosophy, sociology and research methodology. Next to defining the focus of this study, the second most difficult aspect was what literature to take account of and what to discard. This raised questions such as where must an in depth study be made of the literature and where is it necessary to be eclectic? A recent review by Holsapple *et al.*, (1993) showed that there were over 25,000 citations relating to the field of business computing between 1987 and 1991, which gives some indication of the considerable volume of literature associated with the field of end-user computing alone. At the time of writing this thesis this author had a computer database which contained over 650 references to potentially relevant work.

Fisher (1992), when faced with the same problem, developed a set of criteria whereby an article had to satisfy one of the following:

- contain seminal work;
- be frequently referred to by other workers in the field;
- break new ground;
- describe a concept which he found useful;
- summarise part of the theory behind the research particularly well.

This researcher has found these to be useful criteria and has used them to guide her own review of the literature. The literature was searched in several ways. First and foremost from reading relevant publications (journals, trade papers and books). By talking to other workers in this field it was possible to identify about twenty five journals which contained relevant material and which were regularly scanned manually.

A second source was the abstract services and in particular Anbar[1] and ABI/Inform[2], the former being scanned manually as this was the only format available to the author at the time of this research, and the latter being scanned

[1] Anbar is the trade name of the abstracting service provided by MCB University Press.
[2] ABI/Inform is the trade name of the abstract service provided by UMI Proquest.

electronically on a CD-ROM. As and when required, detailed literature searches were made on specific topics such as executive information systems.

1.6 Structure of this Thesis

This thesis comprises nine chapters and a set of supporting appendices, the content of which is as follows.

Chapter 1 - Background to this Research

This chapter describes the rationale, philosophy and ideology which both drove and underpinned this research. It outlines the goals, research methodology and processes for the research. The principles used to guide the literature review and the subsequent selection of sources of data, and a description of the structure of this thesis are covered in this chapter.

Chapter 2 - End-User Computing

This chapter starts by exploring in detail the term and concept of end-user computing and comparing the various end-user frameworks which have been developed over time. A detailed review of the previous studies and models of end-user computing is provided. This is followed by an analysis of the literature of end-user computing in the context of senior executives as end-users. There is a review of the literature on EIS as it pertains to this study, namely the user rather than development and implementation issues.

Chapter 3 - The Nature of Managerial Work

There have been many studies about the nature of managerial work, and this chapter compares the main schools of thought and argues the case for the choice of studies used to underpin this study.

Chapter 4 - Research Methodology

This chapter describes the overall experimental design used for this study and the rationale for the chosen design. The chapter commences with a discussion about the different philosophical approaches to a research problem and in particular the interpretivist and positivist approaches. The range of interpretivist methodologies and techniques is explored with particular emphasis on

Grounded Theory and the interview technique. The rationale is given for using a quantitative data collection instrument (the Myers-Briggs Type Inventory) to support the main qualitative methods as well as the reasons for choosing this particular instrument. The qualitative interpretivist techniques for data analysis are described with particular emphasis on content analysis and cognitive mapping which were the main techniques used.

Chapter 5 - Data Analysis

This chapter presents an overview of the data analysis and specifically the composition of the sample of executives interviewed, their sociodemographic data and a brief description of their organisations.

Chapter 6 - Results I: Variations in Use of the PC Over Time

This chapter describes the range of applications used, the depth and breadth of the executives' expertise with these applications, their frequency of use, how the executives acquired their competence, and how and why their use of the PC has changed over time.

Chapter 7 - Results II: Executive Work and the Use of the Computer

This chapter presents the analysis of the data in terms of the tasks for which the executives used the computer to support them, the benefits they perceive they obtained from their personal use of the computer, and the factors which they see as limiting them from making more use of the computer. The results are presented and discussed within the context of their *modus operandi* as senior executives and in particular using the frameworks of managerial work discussed in Chapter 3.

Chapter 8 - Results III: The Non-User

This chapter presents the data from interviews with non-users and comparisons drawn between the users and the non-users. Reasons are deduced as to why some executives make no use of computers.

Chapter 9 - Discussion and Conclusions

This chapter reviews the overall findings of this study and based on these, posits a model of the executive as an end-user. The limitations and practical applications of this research are discussed, and areas for further research are outlined.

Bibliography - A list of all the material referenced in this thesis.

Appendices - These contain supporting material as follows.

Appendix A - The Myers-Briggs Type Inventory (MBTI) - an overview of the MBTI, its history, the basic principles behind its interpretation and the meaning of the individual profiles produced by it.

Appendix B - Development of the Executive Interview Guide - how the interview schedule was derived: the rationale behind each section, that is from which previous study each was derived.

Appendix C - The Executive Interview Guide - a copy of the interview schedule.

Appendix D - End-User Framework Developed for Sample Selection - a description of the guidelines used to select executives who made different types of use of the computer.

Appendix E - Background Information Interview Guide - a copy of the interview schedule used to illicit background information about each of the participating organisations and executives therein.

1.7 Summary

This chapter presents an overview of the principle, philosophy and previous research which was used both to underpin and drive this research study. It contains a description of the goal of this study and the research questions the study sought to answer. Finally, the structure of this thesis is outlined.

CHAPTER 2 - End-User Computing: A Review of the Literature

This chapter commences with a description of how the field of end-user computing has evolved and provides a review of the different frameworks used to describe the intensity of users' interactions with personal computers. An overview is provided of the many studies which have been undertaken on the factors which influence use of the computer. Several models of end-user computing have been developed which attempt to integrate these factors such as the Theory of Reasoned Action (TRA), the Theory of Technology Acceptance (TAM), and the model of User Acceptance. These are described and compared. The chapter concludes with a section on the senior executive as an end-user, both of personal computer applications such as spreadsheets and Executive Information Systems.

2.1 Introduction

The use of computers outside the management information systems (MIS) department has loosely been termed 'end-user computing' (EUC), and with the evolution of the personal computer the control and management of end-user computing has become a dominant issue for both users and MIS professionals, and especially the latter (for example, Alavi *et al.*, 1987/88; Ball and Harris, 1982; Benjamin, 1982; Benjamin and Blunt, 1992; Benson, 1983; Dickson *et al.*, 1984; Galletta and Hufnagel, 1992; Henderson and Treacy, 1986; Huff *et al.*, 1988; Niederman *et al.*, 1991).

Swanson (1987a) suggests there are three levels of analysis for the field of end-user computer, the individual, the organisation and the market. This research is concerned with the individual unit of analysis and will only draw on the organisational aspects as they are seen to be relevant to the individual. Within the individual unit of analysis Swanson (1987a) suggests there are two clear streams of research, that which is concerned with the determinants of the use of information systems, and that concerned with the effect of the use of information systems. This study is primarily concerned with the former aspect. From the individual user perspective there are three issues which need clarification:

- defining the term;
- defining the depth and breadth (intensity) and complexity of use;
- identifying patterns of use and growth paths.

There have been many studies about what influences managers (at all levels but mostly middle to junior) to use computers, and these can very broadly be divided in to four categories, those which:

- attempted to provide some framework for categorising users' expertise;
- studied the influence of specific and often isolated variables, for example user satisfaction;
- developed a model to explain both the influence of certain variables and their interactions;
- studied processes rather than variables.

This chapter starts with a review of the major end-user computing frameworks and the ones chosen to guide this study. There follows a review of the studies into the factors which are seen to influence use from a general perspective. Early researchers focused mainly on the effect of different variables rather than their interaction. Some of the variable based studies provided contradictory results and often make the field of MIS research look fragmented. Several models of end-user computing have been developed which attempt to look at the interaction of some of these variables, such as the Technology Acceptance Model (Davis *et al.*, 1989) and the model of User Acceptance (Igbaria, 1993). These are reviewed in the light of their contribution to one's understanding of the whole field of end-user computing, especially in terms of making sense of some of the variable based studies. These models, though, remain variable based, rather than process based. The process approach is presented and contrasted to the variable approach with a review of some of the relevant studies which have used this method.

A detailed review is then presented of those issues which specifically relate to senior executives as end-users, including their use of Executive Information Systems (EIS).

2.2 The Evolution of End-User Computing Frameworks

Doyle (1991) argues that in the long term, frameworks may be more of a hindrance than a help, by externally imposing meaning and in turn hiding the real situation. Nonetheless, Doyle (1991) suggests that based on Weick's (1990a) concept of a map, if a framework is viewed as a map which the framework-user owns, the framework can promote action, and when a meta-view is taken, can help create usable plans. Managers' use of computers vary considerably in terms

of the depth and breadth of the applications. In this context, and in keeping with Doyle's (1991) notion of the framework as a map, and Weick's (1990a) notion of a map, it was felt that some form of end-user framework was needed initially to guide this researcher in terms of the composition of the users studied, ie., their range of expertise, and the subsequent data analysis.

2.2.1 Definitions and Frameworks

As indicated in Section 1.4.3, several researchers have developed definitions and frameworks of end-user computing (Amoroso, 1992; Cotterman and Kumar, 1989; Davis and Olson, 1985; Ein-Dor and Segev, 1988; Kraemer *et al.*, 1993; Martin, 1985; McLean, 1979; Rockart and Flannery, 1983; Yaverbaum , 1988). Yet, as Rainer and Harrison (1993, p. 1187) note, 'the large body of research on EUC lacks a common, universally-accepted EUC construct that has been defined, operationalised, tested and validated'.

The papers by Rainer and Harrison (1993) and Amoroso (1992) contain extensive reviews of the various EUC frameworks. In essence, the early EUC frameworks, such as those of Lefkovitz (1979), McLean (1979), Martin (1985) and Rockart and Flannery (1983), which had their origins in the mainframe era of computing, not unexpectedly contain levels of use which related to the MIS professional or data processing professionals as they were known in those days. Rockart and Flannery (1983) defined six types of end-users.

1. 'Non-programming End-users' who access data strictly through limited menu-driven environments with a strictly followed set of procedures.
2. 'Command-level Users' who are able to manipulate data within applications developed by others, and can use a limited set of commands to produce reports.
3. 'End-user Programmers' who are able to develop their own applications using command and procedural languages.
4. 'Functional Support Personnel' who are reasonably sophisticated end- users, develop applications and provide support for others in their function, but who do not hold the title of IS professional.
5. 'End-user Computing Support Personnel' who are generally located within a central support area, and provide support and develop applications for other end-users.
6. 'DP Programmers' who are like the traditional COBOL programmer, except that they now programme in end-user languages.

Some, such as Schiffman and Meile (1988) and Schiffman *et al.*, (1992), collapsed the last two categories into one which they called 'professional MIS person'. Nonetheless, terms such as 'command level' may be less meaningful in the current PC and graphical user interface (GUI) environments. In the case of senior executives terms such as 'professional MIS person' may also not be appropriate. Davis and Olson (1985) distinguished between those who made direct use of the computer (primary users) and those who made indirect use, using the outputs produced by others (secondary users). Culnan (1983) coined the term 'chauffeured user' to describe the latter type of user.

Yaverbaum (1988 p. 76) defined end-users as 'any member of an organisation who interacts with computer systems, but who is not employed as a programmer or systems analyst'. Similarly, Cotterman and Kumar (1989), Ein-Dor and Segev (1991) and Rivard and Huff (1985) excluded the MIS professional from their definitions. Ein-Dor and Segev (1991 p. 32) included an element of discretionary use by defining end-user computing as 'essentially any discretionary, hands on use of either a personal computer or a terminal connected to a larger computer'.

Cotterman and Kumar (1989) developed a three-dimensional 'User Cube' based on the user's operation of the computer, their development of applications and their control over the available MIS resources. They felt that whilst the dimension of control was missing from previous definitions it was appropriate to end-user computing in the late 1980s. They were able to accommodate the frameworks of several previous researchers including those of McLean (1979); Rivard and Huff (1985); and Rockart and Flannery (1983) in their User Cube framework.

Amoroso (1992) noted that the Cotterman and Kumar (1989) User Cube did not identify either where any growth might take place from one type of use to another, or where the bulk of users lie on their User Cube. To take account of some of these issues and the changing nature of the end-user, which he suggests will occur as the technology of end-user computing evolves, Amoroso (1992) developed an 'End-User Characteristics Matrix'. This comprises ten single dimension 'user characteristics' such as training and the nature of the applications developed. For each of his ten characteristics he developed a continuum measure for example, for nature of the applications developed this ranged from simple to complex. He too was able to map on to his End-User Characteristics Matrix the frameworks of other researchers such as Rockart and Flannery (1983); McLean (1979); and Rivard and Huff (1985). Despite this

Amoroso's (1992) framework is vague in places, especially with respect to the nature of the software applications used, and whether or not users move from one category to another and in what direction that move takes place.

2.2.1.1 Rainer's and Harrison's (1993) Framework

Rainer and Harrison (1993, p. 1188) defined end-user computing at the individual level as 'the individual use of computers encompassing all the computer-related activities required or necessary to accomplish one's job'. As such they suggest:

> ' ... this definition differs from that of computer literacy or computer skill. Computer literacy and computer skill connotes what users are actually capable of doing with their computers. This study's definition of EUC connotes what users actually do with their computers while performing their job.' (p. 1188)

They developed a five level end-user framework as follows:

1. 'Beginners' - passive users of menu-driven systems only looking at pre-prepared information and can make no changes to the systems without help.
2. 'Intermediate Users' - input information and create their own report from the systems available information.
3. 'Advanced Users' - develop applications for their own use, using tools like spreadsheets and database packages.
4. 'End-User Computer Facilitator' - who whilst not being MIS professionals have some responsibility for acting as the organisation's MIS trouble-shooter. They test new software, help other users and develop applications for others.
5. 'End-User Computer Infrastructure Person' - an MIS professional.

Rainer and Harrison (1993) validated their constructs on 776 university employees and found 10% of their sample were beginners, 57% fell in the intermediate category, 20% were advanced users, 11% were facilitators and 2% fell in the infrastructure category. They suggested their framework needs to be further validated across other business sectors and personnel, especially managers. Despite its limited use, it does provide a basis and set of constructs which can meet users' depth and breadth of competence. It provides some specific guidelines about the type of software each type of user would be expected to use and their level of skill. For example, an Intermediate end-user would be expected to be able to use the 'basic' features of software packages such

as word processing, spreadsheets, databases, and graphics packages, although the term 'basic' is not explicated in detail.

2.2.1.2 Martin's (1988) Framework

Martin (1988), in his study on managers' use of computer-base decision support systems, developed a two-dimensional framework based on the 'degree of systems connection' (the x-axis) and the degree of purpose connection' (the y-axis). The degree of systems connection 'reflects the proximity of a user to a particular system, ie., whether he interacts directly or indirectly' (p. 37). He defines the degree of purpose of connection as '(a reflection) of the user's relationship to the systems outputs in respect of his own work role' (p. 38). Using these definitions he constructed a three by three matrix as shown in Table 2.1.

Table 2.1 Martin's (1988) Dimensions of Computer Use

Degree of Systems Connection	Degree of Purpose of Connection		
	A) Output used for own job	B) Output used for others to use	C) Output not used by anyone
1. Direct (hands-on, interactive, they control the output they receive)	Engineer	Secretary using a word processor to produce documents	Data processing operator
2. Indirect (receives unedited output on-line or on paper)	Some managers	Management accountant	Filing clerk
3. Remote (receives output second-hand which has been edited either by mouth or as a paper summary)	Most managers	Business analyst	-

He was particularly concerned with managers who fall in to cell 1A, ie., they interact directly with the computer to produce output they subsequently use to execute their own jobs. Martin's (1988) framework is useful as it is designed specially for senior managers, but it was developed to deal with managers' interactions with one specific aspect of computing, namely mainframe decision support systems. As such, its weakness is that unlike Rainer and Harrison (1993) it says nothing about the intensity and complexity of managers' use of other aspects of personal computing.

2.2.1.3 Definitions and Frameworks Used in this Study

As stated in Section 1.4.3, for the purpose of this study end-user computing is defined as 'any hands-on (interactive) use of personal computers and terminals

by non-professional MIS personnel' which is based on the work of Amoroso (1992), Ein-Dor and Segev (1988), Rainer and Harrison (1993) and Yaverbaum (1988). Those who use computer-generated output only in paper form as opposed to accessing it directly on line are regarded as non-users. The end-user frameworks of Rainer and Harrison (1993) and Amoroso (1992) were used to guide the development of the interview schedule and determine users' level of use, as described in Appendix D.

2.2.2 Patterns of Use

Various models have been proposed for the growth of organisational computing (for example, Gibson and Nolan, 1974; Huff *et al.*, 1988; Nolan, 1973; 1979; Schoech and Schkade, 1980) However, as Amoroso (1992) and Cotterman and Kumar (1989) noted, none of the individual end-user frameworks say anything about patterns of use in terms of whether or not users move from one user type to another and if so, how, why and indeed in what direction. Martin (1988) observed that after initial adoption of a DSS, some managers continued their system, whilst others discontinued their use. Some who discontinued use did become users again at some stage. One of the main reasons for stopping use was a change in either role and/or information needs. In his study, Martin (1988) notes some use of other PC applications such as messaging, and spreadsheets, but it is unclear how the use of these applications changed with time. For example, did managers discontinue their use of all the available applications, or only some? Did their frequency and depth of use change over time, and if so in what way?

Martin (1988) conducted his study over an eighteen month period in the early to mid-1980s. The IBM PC was launched in 1981 and Lotus 123 in 1982. Although word processing applications were available, they were substantially command driven. Graphics/presentations applications on personal computers were few and far between, and not very easy to use by the non-MIS professional. Their use by senior executives was therefore probably quite minimal when Martin (1988) conducted his study, hence it is not surprising that he makes almost no reference to these issues.

To explore in more detail the depth and breadth of end-users' use of computers, and in particular personal productivity tools such as spreadsheets and word processing, and how this use has changed with time, one must turn to the end-user computing (EUC) literature.

2.3 Variables Which Influence End-Users

As indicated, the field of (EUC) has given rise to a substantial number of studies about the factors which are felt to affect both a user's disposition to use the computer and their intensity of use. A search of the ABI Inform literature database on the term 'end-user computing' for the period January 1994 to May 1996 produced 763 citations. These were filtered using the literature selection criteria outlined in Section 1.5.1.

Broadly, the studies into EUC can be divided in to two groups, those which relate to factors which are external to the user (for example, Amoroso, 1992; Cheney and Dickenson, 1982; Cheney *et al.*, 1986; Ein-Dor and Segev, 1978; 1991; Franz and Robey, 1986) and factors internal to the user (for example, Davis, 1989; Davis *et al.*, 1989; Harrison and Rainer, 1992; Igbaria, 1993; 1994; Igbaria *et al.*, 1995a; 1995b; Lucas, 1978; Thompson *et al.*, 1991; 1994; Zmud, 1979). The external factors which are to a large extent extrinsic to the user can be subdivided as shown below.

Organisational factors such as:

- culture;
- training;
- level of management support;
- quality and level of technical support;
- MIS culture and infrastructure (eg., size, maturity, location, available resources, etc.).

Systems' design factors such as:

- design of the user interface;
- response speed;
- accuracy of data;
- user involvement in the implementation process.

The internal factors which are primarily intrinsic to the user are classified as:

- attitudes towards MIS;
- perceptions about the usefulness of MIS;
- computer anxiety;
- nature of the job and tasks performed;
- demographic data such as age, gender and education;
- personality factors.

This classification is by no means exhaustive and is simply the map (Doyle, 1991) this author constructed to help her find her way (Weick, 1990a) through the morass of literature on end-user computing.

2.3.1 External Variables and their Influence on End-Users

Comprehensive reviews of previous research in this area can be found in (Amoroso, 1992; Cheney and Dickenson, 1982; Cheney *et al.*, 1986; Ein-Dor and Segev, 1978; 1991; Franz and Robey, 1986). There is no doubt that external factors such as the following can influence systems' use, although the results of previous studies are sometimes equivocal:

- training;
- level of senior management support;
- technical support;
- user involvement during the implementation process.

2.3.1.1 Organisational Context and Culture

Factors which have been investigated, and show conflicting results, include organisational size (for example, Lind *et al.*, 1989; Ein-Dor and Segev, 1988) and culture (for example, Ein-Dor and Segev, 1991; Igbaria and Zviran, 1996; McKinnon and Bruns, 1992; Schein, 1994). Ein-Dor and Segev (1988) found organisations with a higher turnover, not surprisingly, spent more on end-user computing per organisation. In a later comparison of the end-user computing across Israeli and American organisations they found the differences in organisational environment made no significant impact on individuals' use of computers (Ein-Dor and Segev, 1991). Similarly, McKinnon and Bruns (1992) in their study of American organisations found culture had no influence on managers' use of computer systems. However, Schein (1994) found culture was an important factor. In a recent comparison of American, Israeli and Taiwanese organisations, Igbaria and Zviran (1996) found that whilst American managers used the PC the least frequently and were the least satisfied with their MIS systems, they used more complex software than their Israeli and Taiwanese counterparts.

Two reasons for the seemingly inconsistent results with respect to culture may be due to differences in the definition of the term culture and what is being observed. First, it is not always quite clear how authors are defining the term

culture, other than in terms of what Schein (1992a) calls the artefacts of the organisation, and then only the most superficial ones are quoted, such as the industry sector and the organisation's size. Schein (1992a) takes a view of culture which includes other levels, such as the organisation's espoused values and beliefs. Second, some authors such as Ein-Dor and Segev (1991), Igbaria and Zviran (1996), and McKinnon and Bruns (1992) focus on the individual's use of computers, whilst others such as Schein (1994) are more concerned with the organisational use of computers for gaining strategic business benefits.

2.3.1.2 Training

Training has been found to have a direct influence on individuals' EUC competence (for example, Bostrom *et al.*, 1990; Davis and Bostrom, 1994; Gattiker, 1992; Igbaria, 1990; Igbaria *et al.*, 1989; Lee *et al.*, 1995; Mason and Willcocks, 1991; Mawhinney and Lederer, 1990; Nelson, 1991; Nelson and Cheney, 1987; Olfman and Bostrom, 1991; Santhanam and Sein, 1994; Schiffman *et al.*, 1992; Sein *et al.*, 1987; Yaverbaum and Nosek, 1992). Lack of adequate training is often cited as one of the main factors restraining individuals from using a system - mainframe and PC (Mason and Willcocks, 1991; Mawhinney and Lederer, 1990). Little, though, is known about the influence of training on the level of use an end-user may achieve after training. Schiffman *et al.*, (1992) found that more sophisticated users had attended more training courses than less sophisticated users, and that the former used a wider variety of training materials than the latter.

2.3.1.3 Senior Management's Role Model

Again there is some concurrence in area, in that most studies have found that when senior management make personal use of the computer, the individual use of end-user computing increases within the organisation (for example, Ein-Dor and Segev, 1988; 1991; 1992; Igbaria, 1994; Igbaria *et al.*, 1995b; Lee, 1986; Lucas, 1978; Schein, 1992b).

2.3.1.4 Technical Support

Several studies have shown that the level and availability of technical support influences the use end-users make of computers (Ein-Dor and Segev, 1988; Guimaraes and Igbaria, 1994; Igbaria, 1990; 1993; 1994; Igbaria and Nachman, 1990). However, Rainer and Carr (1992) in a study of the role of the information centre found some equivocality in this area. To some extent, they suggest, this

reflects a disparity between the services offered, which are often still grounded in the mainframe era, and the changing needs of end-users. With the growth and maturity of end-user computing the focus for many users has moved away from the more simple and straightforward question of how to 'use' the computer, to the more complex question of how to 'apply' the computer to solve a particular business problem. More recently Guimaraes and Igbaria (1994) found there was a direct correlation between the effectiveness of an information centre and the benefits that organisations received from their investment in end-user computing.

2.3.1.5 Users' Involvement and Participation

Users' involvement and participation in MIS systems design have been widely researched and found to be one of the most important determinants of the use made of management information systems, though, the results of the many research studies have been contradictory. Barki and Hartwick (1994) suggest that the terms participation and involvement should be separated, whilst Ives and Olson (1984) suggest poor research methodology may be the problem. (For reviews of this aspect of the literature, see Barki and Hartwick, 1994; Doll and Torkzadeh, 1988; Ives and Olson, 1984; Lucas, 1978; Rivard and Huff, 1988.)

2.3.2 Internal Variables and Their Influence on End-Users

Zmud (1979) concluded from an empirical analysis of previous studies into MIS systems that, to a large extent, these external factors act as moderators to the internal factors, which he suggests 'exert a major force in determining MIS success' (p. 975). He suggests that 'individual differences', as he termed the internal variables, can be grouped into three categories, of which the cognitive factors have the greatest influence on whether or not the system is used.

1. Cognitive factors - how an individual processes information and views the world.
2. Personality factors - the individual's cognitive and affective behaviour such as introversion/extroversion, locus of control, and tolerance for ambiguity.
3. Demographic and social factors - gender, age and level of education, and professional experience.

Zmud's (1979) paper contains an extensive review of the various individual factors studied prior to 1979. He notes that, whilst personal characteristics and in

particular how people view the world have the 'strongest association', it is not clear whether or not and how the non-cognitive differences influence these cognitive factors. Attitude towards MIS is known to be a determinant of systems' use (Lucas 1975), yet Zmud (1979) felt that there were few studies which had examined the influence of these individual differences on attitude.

Several more recent studies have explored individual differences such as those by Harrison and Rainer (1992); Parasuraman and Igbaria (1990) and Igbaria (1994). Harrison and Rainer (1992) used Zmud's (1979) three categories and found that individual differences such as age, computer anxiety and gender accounted for 56% of the differences in users' competence with the computer. They also found attitude was related to skill, ie., those with a more positive attitude were the more competent users.

Probably one of the most widely researched areas is the influence of attitudes towards the use and success of an MIS (Lucas, 1978; Robey, 1979; Schewe, 1976; Schultz and Slevin, 1975; Swanson, 1982) and more recently the PC (Benson, 1983; Davis, 1989a; Davis *et al.*, 1989; Ein-Dor and Segev, 1991; Igbaria, 1993; 1994; Igbaria *et al.*, 1995b; Igbaria and Chakrabarti, 1990; Igbaria and Parasuraman, 1991; Lee, 1986; Parasuraman and Igbaria, 1990; Thompson *et al.*, 1991; 1994). Again, however, the results of various empirical studies are often inconclusive and contradictory. Davis *et al.*, (1989, p. 983) suggest:

> 'In part, this may be due to the wide array of different belief, attitude, and satisfaction measures which have been employed, often without adequate theoretical or psychometric justifications.'

Thompson *et al.*, (1994) have questioned the substantiveness of the relationship between attitude and use of the computer, and suggest the more important question is the significance of the relationship within a given context rather than whether or not it exists.

2.4 Models of End-User Computing

More recent models (and in particular those of Adams *et al.*, 1992; Bergeron *et al.*, 1995; Davis, 1989; Davis *et al.*, 1989; Igbaria, 1993; 1994; Igbaria *et al.*, 1995b; Mathieson, 1991; Mykytyn and Harrison, 1993; Taylor and Todd, 1995; Thompson *et al.*, 1991; 1994) have taken as their basis the work of the social psychologists (and in particular, Ajzen, 1991; Ajzen and Fishbein, 1980; Fishbein

and Ajzen, 1975; Triandis, 1971; 1979) which relates behavioural intentions to attitudes and beliefs.

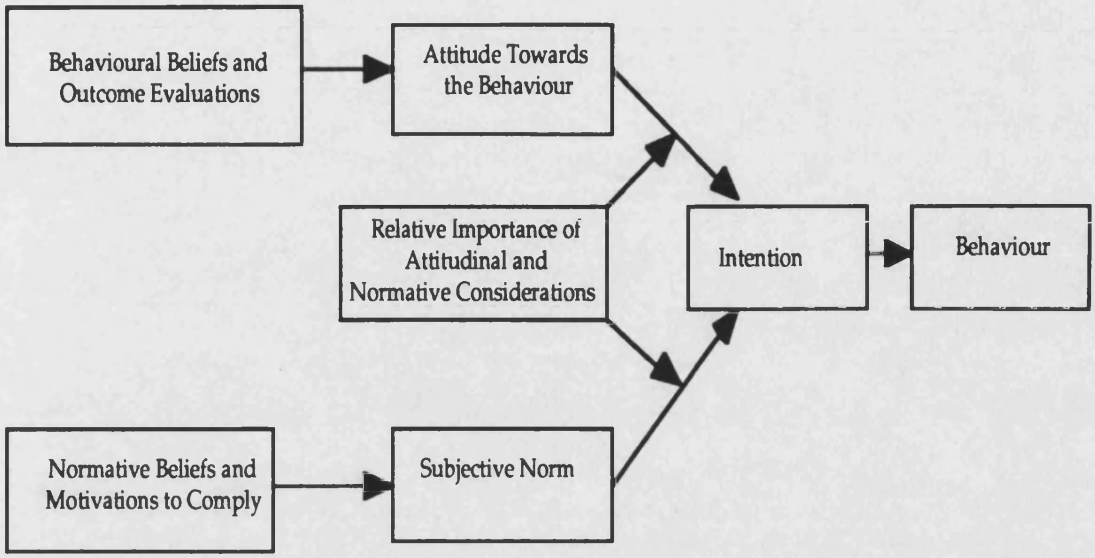
2.4.1 The Theory of Reasoned Action (TRA)

Ajzen and Fishbein (1980) and Fishbein and Ajzen (1975) developed a theory for predicting and understanding behaviour called the Theory of Reasoned Action (TRA) which hypothesises that an individual's intention to perform a specific behaviour is determined by the individual's behavioural intention. That is to say, 'individuals consider the implications of their actions before they decide to engage in a specific behaviour' (Ajzen and Fishbein, 1980, p. 5). They propose that an individual's behavioural intention is derived jointly by the individual's 'attitude towards the behaviour' and their perception of the social pressure either to perform or not perform that behaviour which they call the 'subjective norm'. A person's attitude is formed from their 'behavioural beliefs', and the subjective norm is formed from their 'normative beliefs' which are that person's belief that specific groups or individuals who are important to them think they should or should not perform that behaviour, as summarised in Figure 2.1.

Suppose a manager has a positive attitude towards using a PC and is motivated to comply with what he perceives as the wishes of those he perceives are important to him, eg., his boss and his peers, ie., that he should use a PC. His subjective norm will exert pressure to do so. However, if he perceives this group do not think he should use a PC (perhaps because they themselves do not use one), then he will perceive the subjective norm in the opposite direction which can work independently of his personal attitude, and the subjective norm may therefore exert pressure not to use the computer.

TRA is a general model and does not specify the beliefs that are operative for a given behaviour. Indeed the first step for the researcher using TRA is to identify 'those beliefs which are relevant to the behaviour' (Ajzen and Fishbein, 1980, p. 68). They suggest taking 'modal beliefs' which are most frequently cited by a representative sample of the population being studied. Davis *et al.*, (1989) suggest that one aspect which makes TRA particularly useful from the MIS perspective is the fact that other external factors that can influence behaviour do so only indirectly by influencing one's attitudes and/or the subjective norm or their relative weights.

Figure 2.1 Theory of Reasoned Action (Ajzen and Fishbein, 1980)



Therefore variables such as the level of technical support, training, nature of the task, organisational structure, etc., are regarded as external variables. This, Davis *et al.*, (1989) suggest, implies that TRA mediates the impact of uncontrolled variables and controllable interventions on user behaviour. If this is the case:

> 'TRA captures the internal psychological variables through which numerous external variables studied in IS research have achieved their influence on user acceptance, and may provide a common frame of reference within which to integrate various disparate lines of inquiry' (Davis *et al.*, 1989, p. 985).

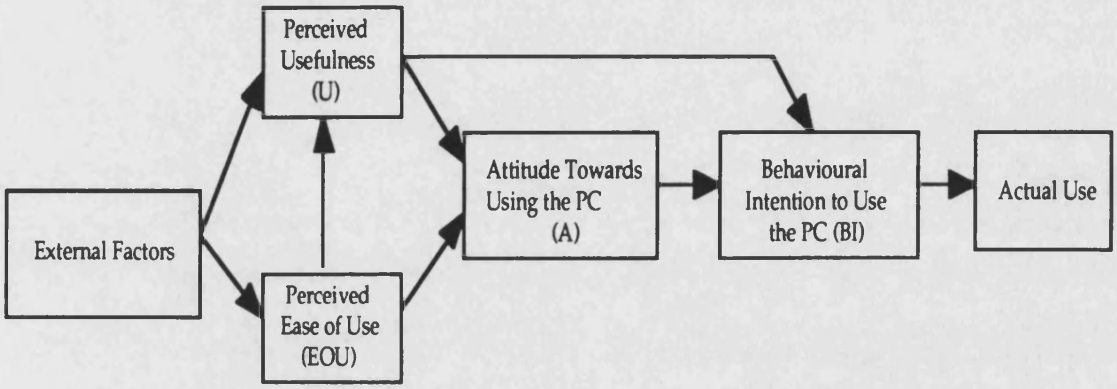
TRA is a well-proven and accepted theory within many behavioural science disciplines (Ajzen and Fishbein, 1980) and has recently been introduced into the MIS field, in particular by Davis *et al.*, (1989), Igbaria (1990; 1993), Igbaria *et al.*, (1995a; 1995b) and Mykytyn and Harrison (1993). The last authors used TRA to explain why many senior managers are reluctant to invest in strategic systems, and explain some of the seemingly contradictory previous research findings.

2.4.2 Technology Acceptance Model

Based on the TRA framework, Davis *et al.*, (1989) developed a Technology Acceptance Model (TAM) to meet specifically the area of user acceptance of MIS systems. In TAM the single attitudinal construct is replaced with two new constructs, 'perceived ease of use' and 'perceived usefulness', as shown in Figure

2.2. TAM was developed with the goal of tracing the impact of external factors on the internal beliefs, attitudes and intentions of end-users. Based on previous work by Davis (1989), perceived ease of use (EOU) refers to 'the degree to which the prospective user expects the target system to be free of effort', and perceived usefulness (U) is defined as 'the prospective user's subjective probability that using a specific application system will increase job performance within an organisational context' (p. 985).

Figure 2.2 Technology Acceptance Model (Davis *et al.*, 1989)



TAM postulates therefore that computer usage is determined by beliefs, but differs from TRA in that behavioural intentions are formed jointly by a person's attitude and perception of the usefulness of the computer. There are also two main differences between TAM and TRA which relate to how beliefs are formed.

> 'First, using TRA salient beliefs are elicited anew for each new context. The resulting beliefs are considered idiosyncratic to the specific context, not generalized, for example to other systems and users (Ajzen and Fishbein, 1980). In contrast, TAM's U and EOU are postulated *a priori*, and are meant to be fairly general determinants of user acceptance and can be considered to be fairly general determinants of user acceptance. Second, whereas TRA sums together all beliefs multiplied by corresponding evaluation weights into a single construct, TAM treats U and EOU as fundamental and distinct constructs' (Davis *et al.*, 1989, p. 988).

They suggest that this approach allows the researcher to trace with more accuracy the influence of external variables such as system features, and user characteristics, etc., on the ultimate behaviour. TAM does not include TRA's subjective norm because, as even Ajzen and Fishbein (1980) acknowledge, this is one of the least understood aspects of TRA. Davis *et al.*, (1989) feel too that it is difficult to disentangle the direct effects of subjective norms on behavioural

intentions from the indirect effects via attitudes. Although use of the computer may be voluntary at senior management levels, senior managers may nonetheless use the computer to comply with mandates from the CEO, rather than because of their own feelings and beliefs.

Davis *et al.*, (1989) tested their Technology Acceptance Model in terms of 107 MBA students' intentions to use a word processing programme (WriteOne). Intentions were measured first after a one-hour training course, and then 14 weeks later. Use of the package was voluntary through a public computer laboratory on the students' campus. They found that it predicted use satisfactorily and specifically:

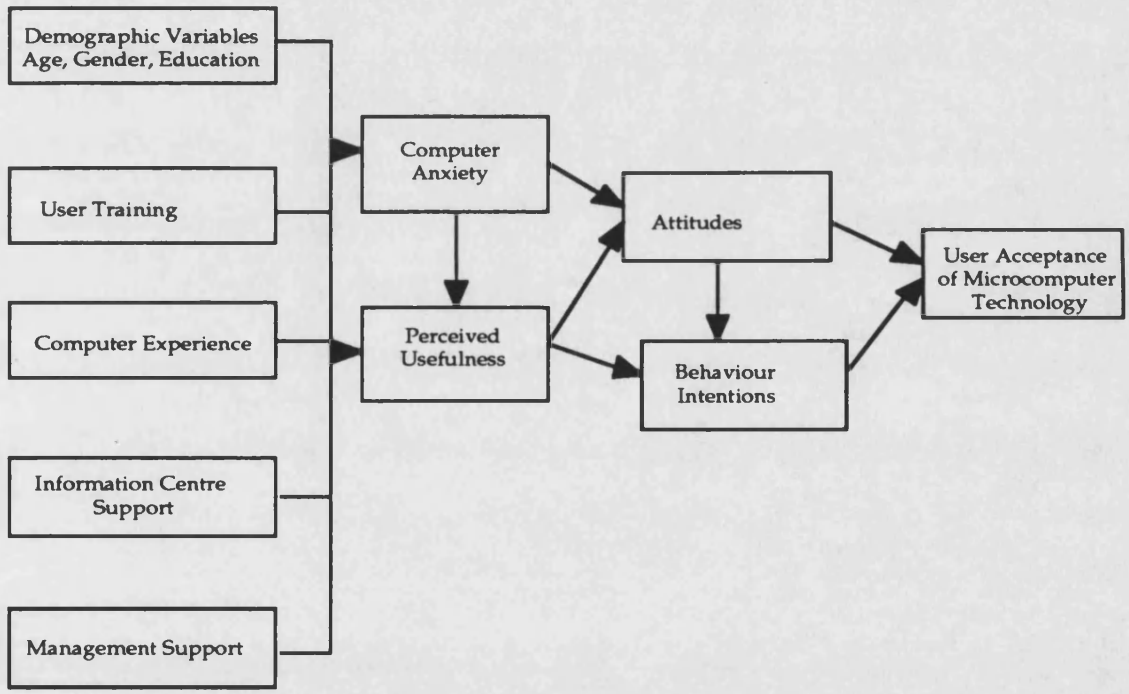
- managers' computer usage can be reasonably well predicted from their intentions;
- perceived usefulness is a major determinant of managers' intentions to use computers;
- the degree of perceived usefulness is moderated by organisational support characteristics such as management support and support from an information centre;
- perceived ease of use is a significant secondary determinant of managers' intentions to use computers.

The role of perceived usefulness as a major determinant of use is in keeping with the previous work of Davis (1989), Robey (1979) and Swanson (1987a). Davis *et al.*, (1992) subsequently showed that perceived usefulness was moderated by the degree of enjoyment they obtained from using the computer. Davis (1993) found that perceived usefulness was 50% more influential than perceived ease of use in determining use. TAM, and in particular the constructs of perceived usefulness and ease of use and their influence on behavioural intentions, have been validated by other researchers (such as Adams *et al.*, 1992; Igbaria, 1994; Igbaria *et al.*, 1995b; Mathieson, 1991). At the same time it has attracted some criticism as regards the validity of the constructs when tested using other methodologies, such as structural equation modelling (Adams *et al.*, 1992; Chin and Todd, 1995; Segars and Grover, 1993) and the effect of factors which could influence behaviour intentions and hence behaviour (Bergeron *et al.*, 1995; Thompson *et al.*, 1991; 1994). However, the criticisms in the former case seem to be more about the use of structural equation modelling techniques. The latter criticisms are discussed in Section 2.4.4.

2.4.3 Igbaria's Extensions of TAM

Igbaria (1993) extended the work of Davis *et al.*, (1989) in conjunction with his previous work (Igbaria, 1990). Using the structural equation modelling approach with partial least squares he developed a 'user acceptance' model of EUC, as shown in Figure 2.3. Using a questionnaire, he surveyed 519 managers (of whom 8% were classed as 'senior') from 43 North American organisations. Only managers who had either a 'microcomputer' on their desks, or easy access to one, were included in the sample. Igbaria (1993) found moderate support for his model. In particular, he was able to confirm the importance of individual and organisational characteristics on the level of computer anxiety and perceived usefulness.

Figure 2.3 Igbaria's (1993) User Acceptance Model



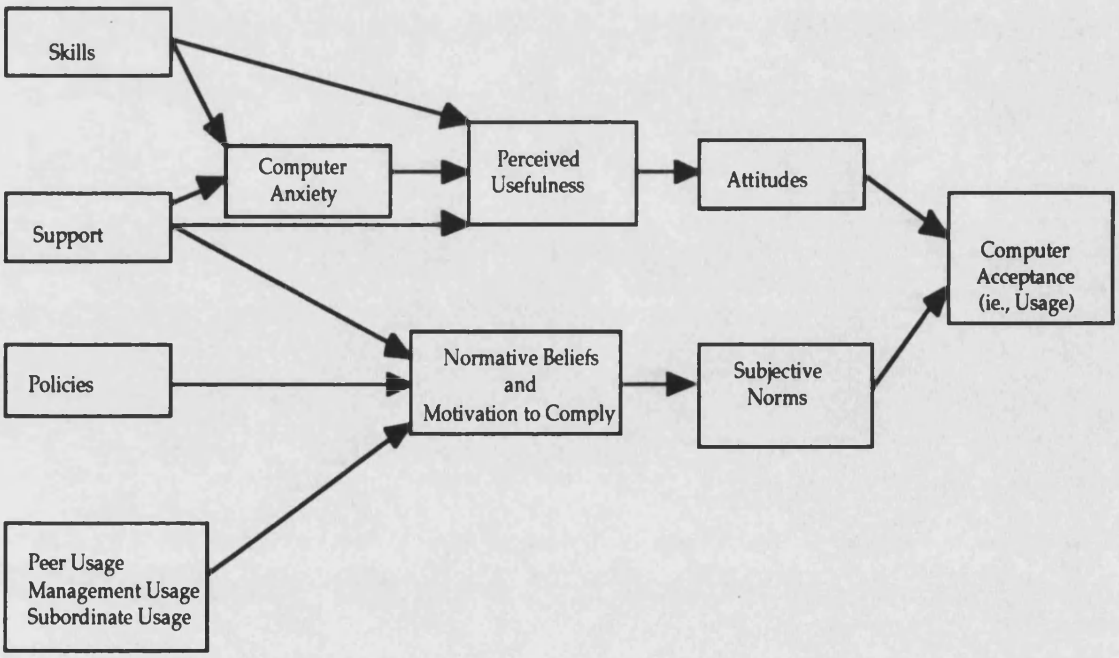
Computer anxiety was found to mediate the relationships between individual and organisational characteristics, and perceived usefulness, which confirmed the findings from his previous studies on the influence of attitudes and computer anxiety (Igbaria and Parasuraman, 1991; Parasuraman and Igbaria, 1990; Igbaria and Chakrabarti, 1990). Computer anxiety had a strong negative effect on perceived usefulness and behavioural intentions, indirect effects on attitudes and user acceptance, via perceived usefulness, and both direct and indirect effects on

behavioural intentions. Perceived usefulness, in turn, plays an important role in mediating the relationship between the individual and organisational characteristics, attitude and behavioural intentions. Behavioural intentions were found to have a strong direct effect on users' acceptance and to be determinants of user acceptance. As Davis (1989) found, management support also had a direct influence on behavioural intentions, and information centre support had a direct influence on perceived usefulness and attitude.

Igbaria (1994) subsequently refined his model of user acceptance to accommodate Ajzen's and Fishbein's (1980) concept of behavioural beliefs and subjective norms, as shown in Figure 2.4. Igbaria (1994) concluded that:

> 'individuals use a PC if they believe that a) using the system will increase their performance and productivity, and b) if they feel social pressure to use microcomputers, mainly pressure from individuals or groups with whom they are motivated to comply, think they should use them. We also found that perceived usefulness and computer anxiety had strong direct effects on attitudes and that both computer anxiety and perceived usefulness mediated the effects of the external factors on microcomputer usage. Subjective norms also had a direct effect on microcomputer usage and mediated the effect of normative beliefs on microcomputer usage.' (Igbaria, 1994, p. 205)

Figure 2.4 Igbaria's (1994) User Acceptance Model of Computer Technology



Computer skills had the strongest effect on use. 'They were associated with both decreased computer anxiety, more favourable beliefs and perceptions about the usefulness of the PC, and eventually greater use' (Igbaria, 1994, p. 220). He argues that this may be related to one's self-efficacy (Bandura, 1977). These and later studies (Igbaria *et al.*, 1995a; 1995b) corroborated the findings of Davis *et al.*, (1989) and found that whilst perceived usefulness and perceived ease of use are still major determinants of use, external factors (such as the level of MIS support and training) can moderate their effect, as indicated in Section 2.3.1.

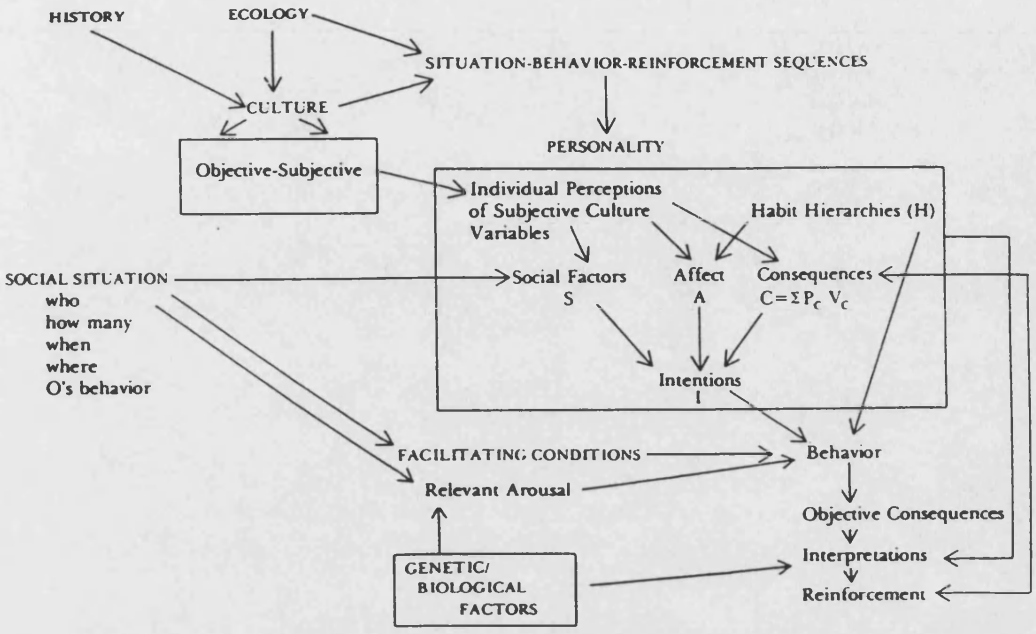
Subsequently, Igbaria *et al.*, (1995b) decomposed use into perceived usage and variety of use, where 'perceived usage' refers to the 'amount of time spent interacting' with the PC, and 'variety of use' refers to 'the importance of use and the collection of specific software used' (p. 109). They found that perceived ease of use whilst influencing both variety and perceived usage does so primarily through perceived usefulness, thus further highlighting the importance of the latter.

2.4.4 Theory of Behavioural Intention

The TRA model of Fishbein and Ajzen (1975) considers all beliefs that a person has about a behaviour as being alike and of equal importance. Triandis (1979) suggests one should distinguish between beliefs that link emotions to the behaviour (and occur at the moment of the behaviour) and beliefs that link the act to future consequences. He argues one's behavioural intention is determined by the feelings one has towards the behaviour (affect), what one thinks one should do (social factors), and the expected consequences of the behaviour. Behaviour in turn is influenced by what one has usually done (habit), by one's behavioural intention and the facilitating conditions as shown in Figure 2.5.

In the case of PC utilisation, one's intention to use the PC would be influenced by one's feelings towards PCs (affect), the social norms of one's surroundings (the work place), past experiences with a PC, the accessibility of the PC, and the expected benefit of using a PC. The work of Triandis (1971; 1979), like that of Ajzen and Fishbein (1980) and Fishbein and Ajzen (1975), has been accepted in the behavioural sciences and has received some application in MIS research (and in particular by Bergeron *et al.*, 1995; Fisher, 1992; Thompson *et al.*, 1991; 1994).

Figure 2.5 Triandis's (1979) Model of Behaviour



2.4.5 Thompson's *et al* ., Models of Personal Computer Utilisation

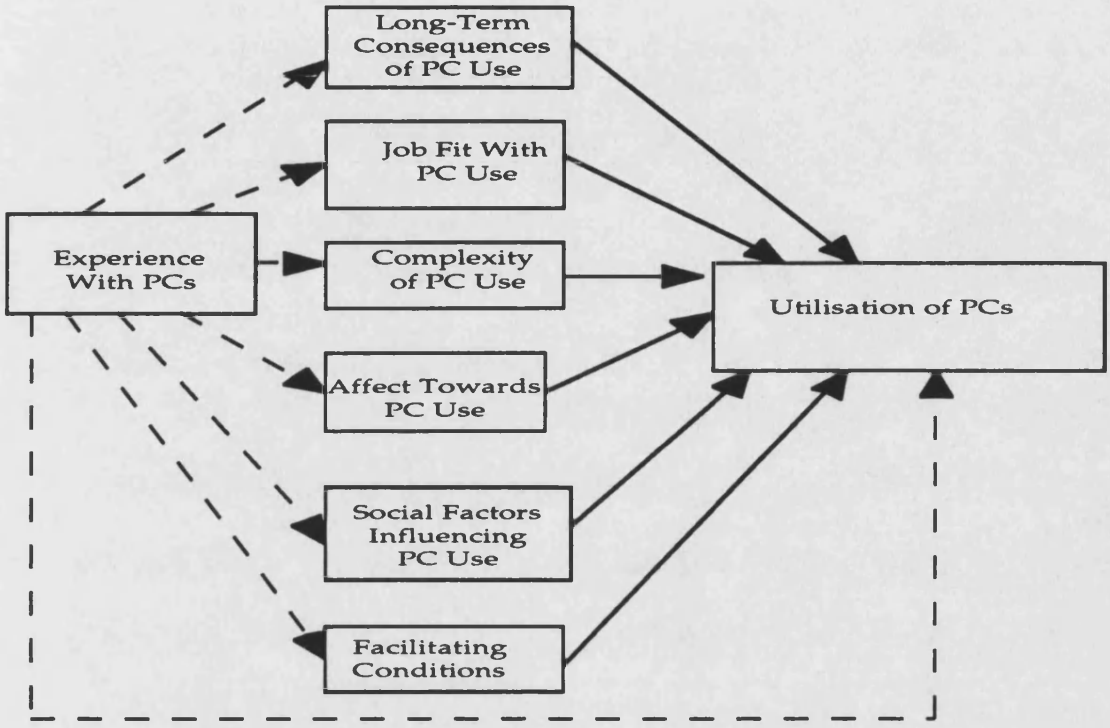
Thompson *et al.*, (1991) initially studied 'the effect of social factors, affect, perceived consequences, and facilitating conditions on behaviour' (p. 126), on PC utilisation using a subset of Triandis's (1979) model, as shown in Figure 2.6. They studied 212 'knowledge workers' in nine divisions of one multinational firm. They surveyed only users, using a questionnaire distributed to participants on a PC diskette.

Thompson *et al.*, (1991) found four of the six relationships were statistically significant ($p<0.01$) as follows:

- social factors within the workplace positively influenced PC utilisation;
- there is a negative relationship between perceptions about the complexity of use of PCs and their utilisation;
- job fit is a predictor of PC utilisation (job fit being defined as a measure of the extent to which an individual believes that using a PC can enhance the performance in their job, eg., by making better decisions, reducing the time taken to complete a task, etc.);
- there is a positive relationship between the perceived long-term consequences of using a PC and PC utilisation.

In two cases the relationship between the variables and their influence on PC utilisation was small and not statistically significantly ($p<0.01$), namely affect, and facilitating conditions, such as support for users.

Figure 2.6 Thompson's *et al.*, (1991; 1994) Models of Personal Computer Utilisation



Note: solid lines show the original (1991) model

Thompson *et al.*, (1991) found some degree of consistency with the theory of both Triandis (1971; 1979), and TRA (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) when applied to the field of MIS. Although the lack of a significant relationship between affect and PC utilisation is at variance with the work of Triandis (1971; 1979) they suggest that this may be because PCs do not in fact evoke any strong emotional feelings, either negative or positive. Their results are also inconsistent with those obtained by Davis *et al.*, (1989), which they suggest may be as a result of the different focus of the studies. Davis *et al.*, (1989) looked at the affect towards a particular package, whilst Thompson *et al.*, (1991) looked at the affect towards the PC itself. However, these differences could also reflect the different theoretical models used. Davis *et al.*, (1989) measured the indirect influence of affect on usage through behavioural intentions, whilst Thompson *et al.*, (1991) employed a direct link from affect to use.

Thompson *et al.*, (1991) suggest that the inconsistency between their results for the role of facilitating conditions and those of previous researchers such as Lucas (1978) may be because they looked at only one aspect of support, namely personal support/guidance. Thompson *et al.*, (1994) extended their model to include the effect of previous experience with PCs, as shown in Figure 2.6. They also split the sample into those who were experienced and inexperienced on the basis of their self-reported level of skill and length of time as a user.

They found that previous experience had a direct and statistically significant influence on utilisation ($p<0.005$). It did not have a strong indirect influence through any one specific antecedent factor, although it did have an effect in general (total combine path = 0.22), but this was not statistically significant ($p<0.01$). Experience did, however, moderate the path between all the antecedent factors and utilisation, except for near-term job fit. These results are consistent with the previous findings of Davis *et al.*, (1989).

Thompson *et al.*, (1994) also compared the influence of the antecedents on utilisation for the two groups of users and found the following.

- Job fit - no difference in terms of number of ways in which the PC could be incorporated into the job.
- Social factors (norms) - greater influence for the inexperienced user, that is, as users become more experienced the social norms become less influential.
- Long term consequences of use - the path is stronger for experienced users, and in fact was almost negligible for inexperienced users.
- Affect - more pronounced for the inexperienced user; as users become more experienced their feelings towards the PC decrease in importance.
- Facilitating conditions - No difference. They suggest this indicates that neither group of users was satisfied with the level of technical support provided, and that experienced users were less satisfied than inexperienced users. They hypothesise that this may be because the experienced users find their needs are very specific to the application they are using and surpass the level of expertise of the in-house support personnel, whilst for the inexperienced users, poor initial facilitating conditions may inhibit use.

These findings led Thompson *et al.*, (1994) to suggest that whilst experience is an important construct it is not adequately captured by the antecedents employed in variable models derived from TRA, and that practitioners need to emphasise the usefulness and applicability of systems to the user's job. Also 'if ease of use is still a

factor after experience has been gained then, unless the perceived benefits are very strong, implementation will likely meet with limited success' (p. 184).

2.4.6 Fisher's (1992) Study

Fisher (1992) also used a model based on the work of Triandis (1971; 1979). He carried out an in-depth study of managers' current and intended use of computer based information systems. He studied over fifty managers from across six organisations and found a framework based on the theory of Triandis (1971; 1979) was helpful when interpreting what forces influence managers' use of such systems. He found the organisational context was the strongest influence on managers' current and intended use of such systems.

2.4.7 Theory of Planned Behaviour

Ajzen (1991) developed a Theory of Planned Behaviour (TPB) which introduces the factor 'perceived behavioural control' (PBC) which is a person's perception of the control they have over the performance of the behaviour. Mathieson (1991) and Taylor and Todd (1995) compared models based on TPB with TAM of Davis *et al.*, (1989). Mathieson (1991) studied 252 students on a management course and responses to the use of spreadsheet packages, and found that whilst both models explained intention to use the spreadsheet packages, TAM explained more variance than TPB and was easier to use than TPB. Using the PBC, intention was predicted by attitude and PBC but not subjective norms which Mathieson (1991) suggests implies that social pressures did not influence individuals' decisions to use the application. Igbaria *et al.*, (1995b, p. 89) suggest that the social pressure did not appear to be influential because 'Mathieson (1991) focused only on determinants of usage rather than external factors effecting these determinants'.

Taylor and Todd (1995) developed a decomposed TPB model by further decomposing the attitude, subjective norm and perceived behavioural components in the light of the literature on Rogers's (1983) diffusion of innovations theory. They collected data from 786 students who were potential users of an information centre and found that a decomposed version of TPB was a 'moderately' better predictor of use than TAM, and the composed version of TPB, but was more costly and complex to use.

Taylor and Todd (1995) found that peer and superior influences were significantly related to subjective norm, and self-efficacy and available resources

were significantly related to perceived behavioural control. By decomposing the belief structures they were able to shed some light on the antecedents to these beliefs and their effects. Contrary to Davis *et al.*, (1989) and Mathieson (1991), they also found the subjective norm did have an influence of behavioural intention. They suggest this could be due to the differences in samples, in that undergraduate students may be more influenced by subjective norms than the students in the two previous studies who were slightly more mature (MBAs and postgraduates respectively).

2.5 Self-Efficacy

Several models allude to elements of Bandura's (1977) social cognitive theory of self-efficacy (eg., Davis *et al.*, 1989; Davis, 1989; Igbaria, 1994; Igbaria and Iivari, 1995; Igbaria *et al.*, 1995b; Lucas, 1978; Taylor and Todd, 1995; Thompson *et al.*, 1991; Robey, 1979; Schewe, 1976). Specifically TAM, Igbaria's (1993; 1994) and Igbaria's *et al.*, (1995b) models suggest that individuals will use a computer if they believe use will result in positive outcome, eg., improved job performance. However, these models do not tell us explicitly how individuals' expectations of their competence to use the PC influence their behavioural intentions. For example, a manager might believe that using a PC would improve their performance, but they not might perceive that they were very competent with a PC. Social cognitive theory (Bandura, 1977) suggests that beliefs about outcomes may be insufficient to influence behaviour, especially if individuals doubt their ability successfully to undertake the required behaviour. Social cognitive theory suggests that watching others perform a behaviour, influences an individual's perception about their own ability to perform the task (their self-efficacy) and hence their expectations of the outcomes of performing that task and therefore, strategies they develop for performing the task. Bandura (1977) suggests that in addition to expectations, 'self-efficacy' must be considered.

> 'Individuals can believe that a particular course of action will produce certain outcomes, but if the individuals entertain serious doubt about whether they can perform the necessary activities such information does influence the behaviour.' (*op.cit.*, p. 193)

The more confident an individual feels about succeeding the more likely they are to try to achieve the task. There have been several recent studies which have focused on the influence of self-efficacy (Burton *et al.*, 1993; Compeau and Higgins, 1995a; 1995b; Igbaria and Iivari, 1995; Webster and Martocchio, 1992). All have found, not surprisingly, that self-efficacy exerts an important role in

shaping users' expectations of what the outcome of using the PC might be and their ultimate use of the PC. For example, Igbaria and Iivari (1995) found those with a higher self-efficacy derived more from their use and leveraged management support better. Self-efficacy had a significant direct positive effect on computer anxiety and perceived ease of use.

However, Compeau and Higgins (1995a), in a study of 95 managers and professionals with little prior computer experience, found a positive relationship between self-efficacy and learning to use a spreadsheet but a negative one when it came to word processing. They suggest these differences may reflect the experimental design and different levels of familiarity with the underlying concepts of spreadsheets and word processing. Whilst all the subjects were computer novices, they were more experienced with the concept writing then of financial concepts related to producing spreadsheets.

2.6 Summary of the Results from these Models

These models of end-user computing have shown that, as Zmud (1979) found from an empirical analysis of the literature, the internal variables are the major determinants of individuals' behavioural intentions to use a computer, and the use they make of it. In particular, perceived usefulness and perceived ease of use are found to be the most influential. These factors are, however, moderated by other internal factors such as computer anxiety, level of enjoyment, self-efficacy, prior computer experience and demographic variables which include age, gender and education.

The external factors which moderate these attitudes towards the computer are among others organisational culture, level of technical support, training and social norms, which include the level of use and support from peers and senior management.

2.7 Comments on these Models of End-user Computing

The models discussed in Sections 2.1 to 2.5 undoubtedly make a significant contribution to our understanding of the field of end-user computing and the factors which influence the use of the computer. Several facets warrant further consideration.

1. Perceived usefulness means different things to different individuals, although in general it has been taken to mean improved job performance (Davis, 1989; Lee, 1986; Martin, 1988; Mawhinney and Lederer, 1990; Nelson, 1989). It is not always clear what specific aspect of job performance is the most important. For example, was it having the right information at the right time, being able to do a task more quickly, being less reliant on others, feeling more motivated, or having better career prospects? Martin (1988), Nelson (1989) and Swanson (1982; 1987b) specifically cite meeting information needs. Boone (1991) found for CEOs other factors were more important, such as being self-reliant and being able to mentor subordinates.

2. Some of the results concerning individual differences such as gender, age and level of education have proved inconclusive and inconsistent (Gattiker, 1992; Harrison and Rainer, 1992; Howard and Smith, 1986; Igbaria and Chakrabarti, 1990; Parasuraman and Igbaria, 1990).

3. Whilst most findings have their roots very firmly in the field of social psychology, few tell us about the influence of the underlying and to a large extent more durable personality factors - such as cognitive style - which cause particular attitudes towards EUC (Zmud, 1997). Harrison and Rainer (1992) specifically looked at cognitive style and found that those with a disposition towards creativity were more likely to be more skilled at using the computer, but they did not find how this related to any of the other variables.

An individual's attitude towards an object such as a PC will be based to some extent on one's basic underlying psychological personality traits, such as those identified by Jung (1923) and later operationalised by Myers (1962) in to the Myers-Briggs Type Inventory (MBTI). Yet there has been less research to investigate how the individual's basic personality traits influence attitudes towards the PC. Most researchers, when referring to individual differences, are referring to what Zmud (1979) defines as the demographic variables.

4. With few notable exceptions (such as Davis *et al.*, 1989; Kraemer *et al.*, 1993; Martin, 1988) most studies have been single-event studies, that is, a one off at a given point in time. Davis *et al.*, (1989), as indicated earlier, studied MBA students immediately after a short training course and then fourteen weeks later. Kraemer *et al.*, (1993) studied 260 departmental heads in 46 government departments over a twelve year period. In each study, perceived usefulness was one of the key factors which influenced whether or not a system was used, but

not whether with time this perception changes. Only Martin (1988) makes reference to those who had stopped using the system. Kraemer *et al.*, (1993) looks rather at the extent of use within the organisation than at the individuals themselves, and acknowledges that their two samples (taken in 1976 and 1988) did not comprise the same individuals .

The acquisition and development of any competence, and its subsequent use in real situations is dynamic (for an extensive review of this topic see Annett (1991)). If the results of using the newly learned competence are positive, one is more inclined to find additional situations in which to use and further develop the competence. Negative experiences on the other hand may result in little or no use of the newly learned competence. The dynamism of the situation is amplified in the case of MIS, where the technology is constantly changing. Technologies (and in particular software packages) which were once only accessible by experienced users can now be used by far less experienced users. New technologies too are continually being developed which lend themselves to the support of certain tasks.

Martin (1988) and Mawhinney and Lederer (1990) observed, over time, some users decrease the extent to which they use their systems, and in some cases actually stop using their systems altogether. Ein-Dor and Segev (1991) noted that users reported that their frequency of use decreased over a ten year period. Newman and Sabherwal (1996), in a longitudinal investigation commitment to IS development, observed that commitment to an IS project changes over time and note that many of the issues relating to these changes would probably not have been captured in a short-term study.

5. Most studies have focused only on users as opposed to non-users, an exception being the study by Martin (1988), who actively sought out some non-users. However, as Zmud (1979) suggests, some knowledge about those who tend to disassociate themselves from MIS 'would enable organisations to focus their educational efforts upon those user groups most likely to inhibit MIS success'. Given that senior executives have been shown to have some influence on end-user computing, and the small proportion of senior executives who are users (Bird, 1991; Nelson, 1989), the senior executive non-users would seem to represent a significant group about whom little is known.

6. There is little or no indication of the effect of these internal factors on either the depth and breadth of use, whether or not, and how users develop their

expertise, and how they move through the levels of use within the end-user frameworks described earlier. It may of course be that there is little movement across the different levels. Some, such as Thompson *et al.*, (1991; 1994), Igbaria *et al.*, (1995b) and Igbaria and Parasuraman (1991), include a measure of what Thompson *et al.*, (1991) term 'diversity of use', although it is not clear either what software packages were used or for what purpose.

7. The sample for these studies has often comprised students (MBAs, postgraduates or undergraduates) whose attitudes towards computers may be different from those of a senior executive.

2.8 Channel Disposition and Message Equivocality

Although not developed as models of end-user computing, there are two other models of systems usage which merit inclusion in this section, that of information channel disposition (Swanson, 1987b) and message equivocality (Trevino *et al.*, 1990). Swanson (1987b) proposed that individuals' attitudes towards management information systems were related to the 'attributed information quality'. This is the importance that the individual places on having the specific information in terms of its quality, and the 'access quality', namely, how easily they can access the information. If a piece of information is regarded as high quality and easy to access, they will seek to obtain it directly from the available channel, eg., the computer. Conversely if it is regarded as high quality but the channel (the computer) is hard to use they will be more inclined to ask others to obtain it. In essence their 'channel disposition' will moderate their use of computer systems for information retrieval purposes.

Trevino *et al.*, (1990) proposed that managers' choice of media for communications depends on the equivocality of the message. Mintzberg (1973) amongst others noted that managers' preferred verbal communications as the information obtained from them was perceived to be richer in quality and this in turn was seen as important when there was some degree of equivocality about the communication. Trevino *et al.*, (1990) developed a framework for media use (from verbal to electronic) which took account of both the richness of the media and the equivocality of the message being communicated. For a message of unequivocal nature and lean content, eg., attending a meeting, an electronic media like e-mail might be used, whereas for an equivocal message where rich content was needed, eg., an investment decision, verbal media would be preferred.

Vandenbosch and Higgins (1995a) and Zuboff (1988) found that some managers preferred paper-based reports to electronic reports, despite the superior accuracy of the data from the latter source. This aspect is discussed in more detail in Section 2.11.4.

2.9 Range of Application used by End-Users

The number of suppliers of end-user software has increased significantly over the past decade (Haynes, 1994) although the purpose of these applications has not increased significantly. For example, Benson (1983) and Lee (1986) cite the use of spreadsheets, word processing, graphics, databases, and electronic mail packages. What has changed is the accessibility of these packages to the end-user: first, in terms of their availability on a personal computer; second, more friendly user interfaces have enabled those who wish to use these tools to develop their own applications. (For example, software like diary management and project management was available on the mainframe but was perhaps harder to use.) Third, there have been new types of end-user software during the past decade, such as contact management and journey planning packages.

Several researchers have mentioned the specific type of software packages used by end-users in general (eg., Benson, 1983; Boone, 1991; Ein-Dor and Segev, 1992; Igbaria *et al.*, 1989; Lee, 1986; King *et al.*, 1992; McKinnon and Bruns, 1992; Martin, 1988; Mason and Wilcox, 1991; Schiffman and Meile, 1988). The range includes word processing, spreadsheets, graphics and presentations, project management, diary management, specialist statistical packages, databases (the software to build one's own application and external specialist databases), and e-mail. The tasks for which the packages were used included communications, planning and forecasting, budgeting, problem analysis, and report writing.

Igbaria *et al.*, (1989) found in their study of 471 managers that 31% of the respondents used the PC for eight different tasks, and fewer than 25% used it for four or fewer tasks. The median for length of use per day was one to two hours, and range of packages was four. These trends are similar to those found earlier by Lee (1986).

Of the available packages, the spreadsheet has been found to be the most popular in terms of being used by more users in preference to other applications, eg., databases and graphics packages (Benson, 1983; Igbaria *et al.*, 1989; Lee, 1986;

Mason and Wilcox, 1991). Igbaria *et al.*, (1989) found 94% of their sample used the spreadsheet and 63% reported using word processing.

2.9.1 Mason and Wilcox's Study

Mason and Wilcox (1991) interviewed 53 middle managers across 26 organisations in New Zealand. They found that whilst all had access to word processing software and 10% had access to database software, the spreadsheet was used even when other software, eg., a database might have been more appropriate for a given task. They found use was unrelated to either the size of the organisation or the available MIS budget. They felt this was primarily because the manager, by virtue of his position, could purchase whatever he needed and without recourse to any organisational control mechanisms.

The reasons for the extensive use of the spreadsheet in preference to other applications related mainly to the initial investment made in learning to use spreadsheets. Consequently managers were reluctant to invest more time to learn another application when they could do what they wanted with a spreadsheet, regardless of whether or not it was the most efficient way to accomplish the task.

2.10 The Senior Executive Versus Other Executives

The few studies, which focused on the senior executives' perspective, fall into two main categories. First, there are those which have investigated mainly the use executives make of management information systems at the functional and organisational level, for example, through a Decision Support System (DSS) and an Executive Information System (EIS), and an Executive Support System (ESS), exemplars being Allison (1996), Boone (1991), Nord and Nord (1995), Rockart and DeLong (1988), Rockart and Treacy (1982), Vandenbosch and Higgins (1995a; 1995b; 1996), Watson *et al.*, (1992) for EIS and ESS, and Martin (1988) for DSS. (There is extensive literature on these types of systems. A literature search of the ABI/Inform Database, for the period January 1994 to May 1996, listed 115 citations for EIS and 40 citations for ESS. As this is not a study about EIS and ESS per se, only those publications which it was felt contributed to this research are cited, in keeping with the criteria outlined in Section 1.5.2.)

Second, there are studies which have explored the use made at the personal level, for example, as summarised in Table 2.2. In most cases the percentage of senior

executives forms less than 20% of the overall sample and any findings often relate to the total sample with no specific reference to the senior executive. Exceptions are the studies of Bird (1991), Boone (1991), Ein-Dor and Segev (1991; 1992), King *et al* ., (1992), Martin (1988) and Nelson (1989). These are discussed in more detail in Sections 2.10.2 to 2.10.7.

Table 2.2 Percentage of Senior Executives in Different End-User Computer Studies

Study	Total Number in Study	% Senior Executives
Martin (1988)	71	100
Lee (1989)	311	3
Igbaria *et al.*, (1989) and Igbaria (1994)	471	8.4
Nelson (1989)	457	100
Thompson *et al.*, (1989)	278	5
Mawhinney and Lederer (1990)	105	Not stated
Ein-Dor and Segev (1991; 1992)	108	17.5
Boone (1991)	16	100
Bird (1991)	111	100
Bird (1992)	1500	*
King *et al.*, (1992)	500	100
Schiffman *et al.*, (1992)	209	11**
Igbaria (1993)	519	19.2
Igbaria and Iivari (1995)	450	3.1

Notes: * No indication is given of the level of management.
** 11% were managers but no indication of level is given.

2.10.1 Executive Information Systems (EIS)

Before proceeding, it is salient to define what is meant by the terms EIS. Whilst, as Allison (1996) notes, there is some consensus about the characteristics of an EIS, there is less agreement as to the precise definition of the term EIS. Rockart and Treacy (1982) originally envisaged that an EIS should contain a substantial amount of data which executives could use to improve their planning, monitoring and analysing of their organisation's business. The user interface would be such that the executive himself could model and interrogate (drill down) the data to meet their specific needs. Thus the EIS was primarily an information tool designed to support the executive in his informational roles (Mintzberg, 1973) and planning and control type tasks (Anthony, 1965). This use of the term EIS is supported by Nord and Nord (1995) and Watson *et al.*, (1992).

Rockart and DeLong (1988) subsequently used the term Executive Support System (ESS) which they defined as 'the routine use of the computer terminal for any

business function' (p. 16). These ESSs as they become known had personal productivity tools such as word processing, graphics, e-mail and diary management facilities. Boone (1991, p. 12) defined an EIS as 'any application of a computer or communication tool in which the executive directly participates in the selection of the problem and the selection, design, or use of the tool' which is closer to Rockart and DeLong's (1988) definition of an ESS.

Watson *et al.*, (1992) and Nord and Nord (1995) note that the terms EIS and ESS are often used interchangeably and suggest that, as implied by Rockart and DeLong's (1988) definition, an ESS has broader capabilities than an EIS. Whilst the term EIS suggests the system provides primarily information, the term ESS implies a system which incorporates other capabilities and facilities to support the executive such as electronic mail, the capturing and analysis of data not already on the system (via, for example, spreadsheets, graphics and database packages), text handling (via, for example, word processing software) and personal organisation tools such as an electronic diary and address book). Thus an ESS has more functionality and could enable the executive to use his computer for tasks other than decision-making.

For the purposes of this study, Watson's *et al.*, (1992) and Nord and Nord's (1995, p. 96) distinction between an EIS and ESS is used, namely that an EIS 'is a computerized system that provides executives with access to internal and external information that is relevant to decision-making and other critical success factors'. Whereas an ESS as defined by Rockart and DeLong (1988) implies a wider range of tools which can be used for any business purpose.

2.10.2 Bird (1991; 1992)

Bird's (1991) survey of 111 chief executives/chairmen of the Times Top 1000 companies, revealed that although 91% saw MIS as a strategic element in building their business strategy, only 51% had a terminal on their desk. The primary use of the terminal was to access an executive information system, using a menu driven system to produce certain pre-defined reports. As the processing power of computers increases, and with the arrival of graphical user interfaces there is increased scope for senior executives to become more active, especially at the personal level. Bird (1991) felt they could use the computer not just to manage the business but also to increase their own personal effectiveness.

In a subsequent survey of 1,500 managers (Bird, 1992) found only 7% actually felt at ease operating their systems for themselves which she felt belied the computer industry's perception that computers are easy to operate. The main reason for the managers' unease was cited as lack of adequate training and the time it takes to master the use of the PC. Other reasons cited for lack of use included lack of interest, absence of keyboard skills, budgetary constraints and poor systems design. No breakdown of managerial level is given in this later survey and it is not clear what percentage of the sample were users. Nonetheless the survey does contain some pointers about the task the PC is being used for, perceptions of the benefits gained from use, and how the PC has changed working habits.

The benefits of the PC to users included ability to speed up tasks (62%); doing things they couldn't do before (49%); a better focus on priorities (22%); improved communications with other managers (16%); and making the job more interesting (12%). About half (54%) said the PC had enabled them to change how they work, and specifically in terms of being more flexible about where they worked, eg., from home, and with whom they networked with regards in being able to communicate more easily with people geographically remote from them.

2.10.3 Ein-Dor and Segev (1991)

The only finding which related specifically to level of seniority was that of intensity of use (% of the working day for which the computer is used) which decreased as levels of seniority rose. Their focus was more on the effect of the CEO's use or non-use on the level of use of EUC through out the origination. As noted, they found that when the CEO was a user, this increased the overall use made by other managers.

2.10.4 Nelson (1989)

Nelson (1989) surveyed 457 CEOs from the Fortune Top 500 companies. He found that only 21.4% used a computer of some sort. Of those who did not use a computer the most commonly cited reasons were:

- a reluctance to learn (32%);
- had a subordinate who used the PC for them (29%);
- could see no use (27%);
- had no time to learn (12%).

The availability of a subordinate to use the PC is in keeping with the concept of the chauffeured user developed by Culnan (1983).

2.10.5 King *et al.*, (1992)

King *et al.*, (1992) studied the use that state and local government managers made of PCs and MIS in general, as part of a larger longitudinal study on computerisation in 46 US cities. Their focus was on seeing whether or not the 'knowledge executive' existed in reality. This publication highlighted their findings for 500 plus 'executives' and 'heads of departments' who participated. The bulk of the data compares use of the mainframe to PC use. They found that those who were PC users (compared either to mainframe or indirect users) were more likely to be younger, and have been working for fewer years, have a PC at home and have more of an interest in computing. The latter was seen as one of the most important factors in an executive's decision to use the PC. They found no gender differences, and no significant relationship between previous use of the computer and current use. (Many of the executives in their study would have used the mainframe as part of their job at some point in their career in government.) So they felt the latter point indicates that an executive's decision to use a PC from a mainframe is a not a straightforward evolutionary process.

The range of applications used is very similar to that found by other users, as outlined in Section 2.9. They found that of the executives who had migrated to the PC, their use of the PC was not necessarily higher than their previous use of the mainframe. Extent of use was far more task and habit related than technology related. Indeed King *et al.*, (1992) note that learning to use the PC involves a steep learning curve which often needs to be climbed several times as one masters new hardware and software.

They looked at the type of difficulties the executives encountered with the hardware and software and found the most frequently cited ones were:

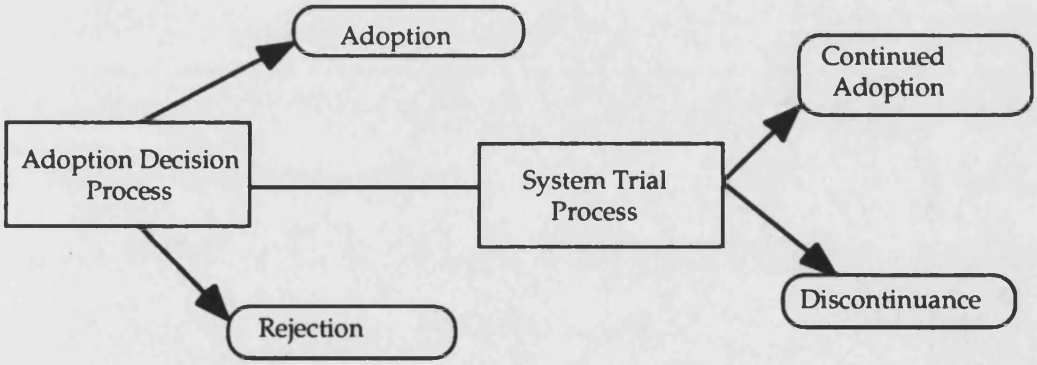
- software not meeting their needs;
- difficulty in obtaining an evaluation of a package so that they could judge whether or not it would meet their needs;
- incompatibility across packages;
- finding adequate help.

Whilst these problems were seen as just as relevant regardless of level of expertise, the frequency of their occurrence varied from no problem to a frequent problem. In terms of the impact of the use of the computer (PC or mainframe), they were seen as more useful for financial management tasks than operational management, obtaining information, saving time finding information, doing tasks which could not otherwise be done and performing their jobs more effectively. Some differences were observed depending on the type of task, but they did not alter the overall findings concerning the usefulness of the computer.

2.10.6 Martin (1988)

Martin (1988) interviewed 71 senior executives from a range of organisations of different sizes (large to small) and looked at their patterns of adoption and disuse of DSSs. His study is different from most of the other studies relating to executives in that he focused on patterns of use in terms of executives' adoption and rejection of a DSS and the reasons for these changes in use.

Figure 2. 7 Martin's (1988) Model of the Managerial Computer Adoption Process



Martin (1988) found that the managers in his study followed an adoption and use cycle which had two stages, as outlined in Figure 2.7. (He used Rogers and Shoemaker's (1971, p. 102) 'paradigm of the innovation-decision process' as the basis of his model.) There is an initial decision process which results immediately in either adoption or rejection. If the DSS is adopted there follows a 'trial phase' which in turn results in either continued use or discontinuance.

The reasons for initial adoption included:

- peer pressure, despite the notion that senior managers have discretion over how they execute their role, some felt obliged to use the DSS; (This is

consistent with the TRA model of EUC and the influence of the subjective norm.);
- providing a leadership role and setting the organisational values and culture;
- a fascination with the technology, as King *et al.*, (1992) found, and a desire to make a personal evaluation of the use of the DSS;
- an expectation that use would bring some benefits;
- they were already users before they became senior executives and using the DSS was just an extension of the available tools.

The main reasons for continued use included:

- use of the DSS became successfully interwoven with their overall managerial activities;
- the system delivered some benefits.

In many cases of continued use, Martin (1988) notes that use was restricted to specific features and facilities. He attributes the need to balance the time to learn to use other aspects of the systems against the benefits to be gained. This is similar to the situation observed by Mason and Wilcox (1991) amongst others who found managers will use a spreadsheet to the exclusion of other more suitable applications.

In the case of initial rejection the main reasons cited were:

- successful resistance to pressure from high-level advocates;
- perceptions that use would convey no advantage over the methods already in use, eg., paper reports;
- perceptions that use was not relevant to the manager's role or tasks;
- perceptions that use would be a waste of time and effort.

In the case of discontinuance after initial use, the main reasons Martin (1988) found related to:

- difficulties in using the system which made the user feel that the benefits were not worth the effort of using the system;
- a mismatch between the manager's information needs and those produced by the system.

Martin (1988) was thus able to explicate the motives for initial adoption from those for continued use of a DSS, and highlight the difference.

2.10.7 Boone (1991)

Boone (1991) studied 16 CEOs and their use of the computer, the benefits they obtained from their use and the barriers to use which they encountered. (Although she uses the term EIS, as indicated in Section 2.10.1, her definition of an EIS is more akin to an ESS.) Her study too was interview based, unlike most of the other studies cited where the data was obtained from questionnaires (other exceptions being the studies of Martin (1988) and McKinnon and Bruns (1992). Boone (1991) found these CEOs used a wide range of applications similar to those outlined in Section 2.9. Of particular interest for this piece of research were the benefits and barriers to use which Boone (1991) found.

The main benefits these CEOs obtained from their personal use of the computer were that use enabled them to:

- leverage their time - by being more responsive and being able to work independently of time and location;
- be better informed about their businesses - by having more timely information, more information, and being able to absorb the information more quickly;
- communicate better - by being more accessible, improving the clarity and consistency of their messages, and personalising messages;
- act as coach to their managers - by building credibility as leaders, tracking commitments, balancing the need to know with the need to delegate and broaden people's perspectives;
- shape the organisational culture - by focusing people's attention on what was important, measuring performance on selected goals, flattening hierarchies and empowering people;
- enhance their personal thinking - by managing complexity better, thinking creatively, balancing logic against intuition and improving group thinking.

Some of these, such as the ability to develop mental models, are classic benefits of using an EIS and ESS (Rockart and DeLong, 1988; Rockart and Treacy, 1982; Vandenbosch and Higgins, 1995b; 1996). Others, such as better communications and coaching, come from a mix of using a conventional EIS and end-user (or ESS)

software such as word processing and graphics packages. The most common barriers to use were cited as:

- having someone else to use the computer for them;
- not wanting to give up their secretary;
- not being able to type;
- making mistakes;
- being too old to learn;
- feeling that they would work even longer hours if they used a computer.

Boone (1991) found that the motivation initially to use the computer and the subsequent benefits depended on a combination of the person and the context within which they were working. For example, for some who headed up global organisations there was a high need to stay personally in touch with the managers of the business units, and use of the computer was seen as critical to achieving this goal. For others, use of the computer was felt to support their high need to communicate both internally and externally. For yet others, use was driven by a need to act as a coach encouraging others to take responsibility. By using the computer these CEOs felt they were firstly setting an example and secondly able to use the information they obtained to provide feedback loops about performance.

2.11 EIS Compared to Other End-User Computing Software

Apart from the fact that these systems are deemed to be specifically for the executive, there are several features which in many ways differentiate an EIS from the personal productivity tools discussed in the previous section, such as word processing and spreadsheets.

First, unlike these personal productivity tools, an EIS needs to be developed by an MIS specialist (and indeed often a team of specialists (Watson *et al.*, 1992)) and it can take a minimum of four months before a prototype is available for the executive to use. EISs do not come ready to use. Interestingly Webster and Martocchio (1992) observed that the opportunity to 'play' with a computer promotes use. Not surprisingly, much of the literature is devoted to the development and implementation of EISs in terms of the development process, and the features and facilities which should be provided. (For reviews of this aspect of the literature see Allison, 1996; Fitzgerald, 1992; Rainer and Watson, 1995; Watson *et al.*, 1992). Second, EISs are expensive to develop and can cost

upwards of £250,000 to develop and £100,000 to maintain (Watson *et al.*, 1992). Although these cost and development times have come down with the introduction of object oriented software an EIS is still not an off-the-shelf, ready to use system and still represents a significant investment.

2.11.1 Characteristics of an EIS

There is general agreement that the key characteristics of an EIS are that it is tailored to the individual executive's information needs, has a graphical interface, provides access to data (internal and external) which can be explored in more detail by the executive, is easy to use, is used directly by the executive without intermediaries, and can present the information in a variety of formats such as graphical, text and tabular (Watson *et al.*, 1992).

Ease of use is a somewhat nebulous term and means different things to different people, especially in terms of their computer experience; for example, what is easy to an experienced user may be perceived as hard for a non-user. Rainer and Watson (1995) tried to explicate this variable and found that ease of use encompassed minimal training to learn the system, and an 'adaptable interface' such that executives could use whatever interface device best suited them, from mouse to keyboard.

Designing and implementing an EIS with these characteristics does not, however, guarantee that it will either be used or regarded as successful by an executive (Rainer and Watson, 1995). In their recent studies Rainer and Watson, (1995) and Bergeron *et al.*, (1995) found that from the executives' viewpoint the most important aspect was not surprisingly, that the EIS related to how they worked (their 'habit', in Triandis's (1979) terms), their business needs, and provided them with benefits such as saving time. This last item is in keeping with the studies of end-user computing discussed in Section 2.4 which have shown that perceived usefulness is one of the key motivators and determinants of use.

2.11.2 Benefits to the Executives of Using an EIS

There are some excellent case histories which have demonstrated how executives have used EIS, as indicated in Section 2.10. Whether or not EIS has in reality been as widely used as proponents would like is another issue (Fitzgerald, 1992; Watson *et al.*, 1992). The purpose of this section is to draw on the EIS literature which it was felt was relevant to this study, the main issues being the tasks the

EIS is used for, and the benefits and conversely the drawbacks executives perceive in using such systems.

The study by Boone (1991) encapsulates the findings of many previous and subsequent studies (for example, Bergeron *et al.*, 1995; Nord and Nord, 1995; Rainer and Watson, 1995) in terms of why executives use these systems and the benefits they subsequently obtain from their use, and indeed some of the inhibitors to use. One of the main differences of Boone's (1991) study to that of previous researchers was that she tried to link the findings to the context within which the executives operated and their personal *modus operandi.*

2.11.3 Drawbacks for Executives of an EIS

Despite the success stories, Watson, *et al.*, (1992) notes that many EISs still fail and lie unused, whilst Fitzgerald (1992) observes that they are not used as extensively as one might imagine, and have yet to fulfil their true promise. Vandenbosch and Higgins (1995b) have questioned whether an executive's use of an EIS necessarily leads to his organisation gaining an advantage in terms of competitive performance.

Several reasons have been put forward as to why this might be and, again, Boone's (1991) study encapsulates many of the more tangible reasons such as the fact they are still not as easy to use as one might imagine. More recently, as indicated in Section 2.8, Vandenbosch and Higgins (1995a) reassessed the situation in terms of channel disposition theory (Swanson, 1987b), media richness theory (Trevino *et al.*, 1990) and the social influence model of technology use (Fulk *et al.*, 1990). Vandenbosch and Higgins (1995a) surveyed 66 executive users of EIS. Respondents were asked to compare their use and the usefulness of EIS produced information to paper-based and face-to-face sources of information. Their constructs of perceived usefulness and use were based on those of Davis (1989). They found that age and tenure were not correlated with use. Training and experience were not correlated with ease of use which, they feel, suggests that EIS may have 'surmounted the technology hurdle' (p. 113).

Whilst the information obtained from the EIS was seen as the most accurate, paper and face-to-face media were preferred, which supports what one might expect from channel disposition theory and media richness. Vandenbosch and Higgins (1995a) suggest one explanation might be that quality and accuracy are not considered by executives to be the most important attributes for selecting an

information channel. An alternative is that, based on the social influence theory, executives would prefer paper-based reports out of habit. They also note that some of the executives in their study commented on the fact that first, paper is more mobile, ie., they can carry it with them more easily than a computer. Second, some of the executives commented that they did not need up-to-the-minute information, as most of their time was spent thinking about the future rather than figuring out the past. Third, meaningfulness and helpfulness were two attributes which were considered as important and these are not necessarily attributes which are easy to convey though an EIS.

These findings concur with the suggestions of Weick (1985) and Lilley (1992) that, far from being an enabler, EIS can have severe disabling effects. Weick (1985) suggests that one of the problems associated with using electronic information sources is the possibility of encountering a 'cosmological episode' (p. 51) whereby the information from the PC loses its meaning. Lilley (1992) asserts that, despite technological advances of the EIS, much of the information available on an EIS merely serves to support the regulation and control of existing and established practices and hence reinforce single loop learning and not the double loop learning necessary to change (Argyris, 1991; Argyris and Schon, 1980). Despite the ability to drill down and interrogate the data held in the EIS, executives are in reality only looking at the same corporate data that were used to develop the EIS in the first place. Because of this, they are not offered the opportunity to assess and reflect critically on the meaning of the data - a facet which is important for double-loop learning and hence bringing about organisational learning and change.

Zuboff (1988) found that individuals can experience difficulty interpreting electronic data. In her analysis of how to master the electronic text and drawing on the work of Newell and Simon (1972) she suggests a key feature is the ability to understand patterns which can then be stored as tacit knowledge. This tacit knowledge is then used 'to facilitate recognition of the decision alternatives and frees the mind for the kind of insight that could result in innovation and improvement' (Zuboff, 1988, p. 192). This sort of meaning and tacit knowledge cannot be gained without a level of 'intellective skills'. Newell and Simon (1972) studied chess masters and found that once the chess master recognised the pattern on the chessboard it triggered an immediate knowledge of the possible courses of action and thus freed them up to deal with the more sophisticated problem of overall game strategy. Meanwhile the less experienced player had to think consciously through the possible courses of action, leaving them no time to deal with the

strategy. Similarly, Isenberg (1984) suggested that executives could use computers to deal with the routine aspects of their work so as to free themselves to think about the more strategic aspects of problem solving.

Thus the lack of use of EIS by executives may on the one hand be due to tangible and outwardly visible factors such as the system being hard to use. However, there are also deeper factors at play such as a mismatch between their way of working and information needs and the information provided by the EIS. These may in turn be related to deeper issues such as the lack of intellective skills.

2.12 Do Senior Executives Warrant More Attention as End-Users?

The paucity of studies on senior executives' personal use of MIS may reflect several factors. First, as discussed in Chapter 1, to some schools of thought the concept of the senior executive as an end-user is a contradiction in terms (Ackoff, 1967; Earl, 1989; Scott Morton, 1991), although this is in stark contrast to the modern schools of management thinking (Kanter, 1992). Second, there are undoubtedly tasks which a senior executive carries out which do not lend themselves easily, if at all, to support from computers. Conversely, if a task was malleable to support from computers, the technology (hardware and software) may not have been either accessible or available to the senior executive. With the advent of small, powerful personal computers and graphical user interface software, many necessary technologies are now accessible to the senior executive.

It might be argued that in fact senior executives do not warrant special attention, especially given that they do only form a small percentage of the total population of managers. However, as discussed in Chapter 1, there are a number of factors which differentiate the environment of the senior executive from that of his middle and junior counterparts, such as the choice they have over their *modus operandi*, and hence whether or not they become direct user of computers at the personal level rather than 'chauffeured users' (Culnan, 1983). As a direct consequence, they are in a position to push for computers rather than be pulled along, the latter being the case at lower levels.

Whilst there is contradictory evidence as to whether or not the kind of work managers do differs at different levels, there is considerable evidence that the orientation does differ at different levels (Mintzberg, 1973). Mintzberg (1973) has shown that, in comparison to lower levels of executives, senior executives spend more time outside the organisation; are more focused on external issues; are less

concerned with real-time aspects of their job; collect and use a wider range of information; are more concerned with strategy-making; are less concerned with current specific issues and more concerned with the longer term wider strategic issues; and have more elastic and longer decision-making time frames. Kotter (1982) and Mintzberg (1973) also found that senior managers' internal channels of communication often do not coincide with their formal lines of authority.

One could therefore argue that if these senior executives do not understand and exploit fully the potential of MIS they may not be including it in their vision of the future. Moreover, as Boone (1991) amongst others has shown, there is some evidence to suggest that executives who do use the computer perceive that it helps them improve performance and productivity as senior executives.

2.13 Summary

This chapter reviewed the different definitions of end-user computing and frameworks available to describe the depth and breadth of an individual's competence as an end-user. Various models of end-user computing have been developed to explain what factors influence the use an individual makes of the computer. These have demonstrated that managers' decisions about whether they use a computer when use is optional, are complex and influenced by a number of intrinsic and extrinsic factors. Regardless of level of seniority, internal factors such as the perceived usefulness and perceived ease of use are amongst the most significant determinants of use. Computer anxiety can moderate the effect of these internal variables as can the external such as the level of technical support and available training.

A range of applications are used by end-users, from stand-alone personal productivity tools such as word processing and spreadsheets to corporate MIS, DSS and, in the case of the senior executives, EIS.

Most of the studies have looked at the end-users' competence at one particular point in time, and so there is little information available about whether or not users' patterns of use change over time, and if so what factors affect a change and in what way. One previous researcher, Martin (1988), noted that senior managers did sometimes discontinue using their DSS, and although some re-adopted the computer later others did not. For many users, becoming a user means an investment in time (both their own and the organisation's): disuse may

represent an expensive waste of valuable resources, especially for senior managers for whom time is their most valuable asset.

Much of the current literature pertains to middle and junior levels of management, although there is evidence that some senior executives use the computer to improve their personal effectiveness as an executive. Given the role the senior executive has not only in managing the use of organisational resources such as MIS, but also in establishing the culture of the organisation it would be helpful to know more about what promotes their use. How much of what we know about end-user computing at the junior and middle management levels, and of the senior executive's use of EIS, is transferable to the senior executive as an end-user?

CHAPTER 3 - The Nature of Managerial Work

This chapter explores the content, form and context of managerial work, compares the main schools of thought and argues the case for the choice of studies used to underpin this research. It looks at the influence of individual differences, and in particular personality, on how managers undertake their work. This chapter concludes with suggestions about how senior executives could personally use the computer to support them, and the influence of their personal attributes in doing so.

3.1 Introduction

Throughout this chapter the terms manager and executive are used interchangeably and although they may not always be prefaced by the word 'senior', there is an implicit assumption that the term refers to senior levels of management. To explore how senior executives are using PCs as a personal productivity tool is to assume that there are some tasks which these executives perform for which it may be beneficial to use the PC. This statement poses two questions: first, what tasks typify the work of a senior executive? Second, which of these tasks could be supported by the use of a computer?

The nature of the managerial work has been the subject of many previous research studies (for example, Barnard, 1938; Carlson, 1951; Fayol, 1949; Kotter, 1982; Luthans *et al.*, 1985; Mangham and Pye, 1991; Mintzberg, 1973; 1989; 1994; Sayles, 1964; Stewart, 1967; 1982; 1991). Carroll and Gillen (1987), Hales (1986) and Martinko and Gardner (1985) have shown that there is a certain lack of coherence, continuity and agreement about exactly what executives really do. Hales (1986) argues that this arises primarily as a result of the different research methods and models used, whether or not the focus is on either the process or the product of managerial activities, and whether or not the facet observed is either the task or the behaviour.

Whilst this study is about how executives are using PCs to support their personal effectiveness, this begs many questions about the underlying nature of their work, and not least the following:

- What activities typify the work of an effective executive?

- What is the typical content of executive work?
- What are the cognitive processes executives use?
- How does the culture of the organisation influence the nature of executives' work?
- What do we mean by effective, ie., what is an effective executive?
- What aspects (eg., activities and content) are exclusive to executives?
- How do the individual attributes (eg., personality and sociodemographics) influence the way an executive works?

Broadly, one could view the nature of managerial work in terms of what Mintzberg (1973) calls the content and characteristics of managerial work, such as the activities and behaviours managers perform to conduct their work. Surrounding the content and characteristics is the culture within which they work, and the individual characteristics of the manager. This chapter provides a very brief overview of the main schools of writing on the form of managerial work, the context within which managers work, and how this has changed and is changing. There follows a discussion on individual differences and in particular the Jungian psychological types, and how these are relevant to the senior executive and how he operates and might use the PC.

3.2 Schools of Management Studies

As Mintzberg (1973) suggested, the various schools of thought on managerial work can be grouped into seven broad categories, as shown in Table 3.1. The guidelines outlined earlier for deciding what literature to include and omit are used here to decide which studies on the nature of managerial work to draw upon, namely those studies which have been seen to inform previous researchers in this field and which make sense to this researcher. Despite criticism by other authors, such as Hales (1988) and Carroll and Gillen (1987), the studies of Anthony (1965), Barnard (1938), Isenberg (1984), Kotter (1982), Mintzberg (1973), Stewart (1967) and Weick (1983) have probably been the ones most frequently cited over the past twenty years, not only within the general field of management, but also within the field of MIS. In particular, those of Mintzberg (1973), Isenberg (1984) and Kotter (1982) have been used by previous researchers as a foundation for exploring how computers might relate to and support the work of the senior executive, albeit mainly in the context of organisational and functional systems (for example, Fisher, 1992; Fitzgerald, 1992; Martin, 1986; 1988; Rockart and DeLong, 1988; Vlahos and Ferratt, 1995; Zuboff, 1988).

Table 3.1. Schools of Management Studies

School of Thought	Exemplars
Classical	Anthony (1964), Barnard (1938), Fayol (1949), Drucker (1979)
The Great Man[1]	Bennis (1993), Sloan (1964)
The Decision Theory[1]	March and Simon (1958)
Leadership[2]	Sayles (1964), Zalenick (1992)
Work Activities[1]	Carlson (1951), Stewart (1967), Kanter (1977), Kotter (1982), Mintzberg (1973)
Intellective[3]	Weick (1983), Isenberg (1984)
Interpretivist[4]	Mangham and Pye (1991)

Notes:

1. Mintzberg's (1973) terminology.
2. This author's term to cover Mintzberg's (1973) three categories of leadership (power, effectiveness and behaviour) and the entrepreneurship school.
3. Zuboff's (1988) term.
4. This author's terminology

To a large extent the classical schools of thought were concerned with the content of managerial work, an exception being Barnard (1938) whose treatise also focused on processes. The work activities schools are concerned with the form of managerial work, whilst the leadership, great man, decision-making and intellective schools are a mix of content and process, and the interpretivist school is more slanted towards the social process of managerial work.

3.3 Classical Schools and the Content of Managerial Work

Barnard (1938, p. 215) suggested that executive work was concerned with 'the specialist work of maintaining the organisation in operation'. He believed:

> 'the essential executive functions are first, to provide the system of communication; second to promote the securing of effort; and, third to formulate and define purpose. ... (they) are interrelated and interdependent (and are) subject to considerable specialisation' (p. 217).

> '(The executive functions) have no separate concrete existence, they are parts or aspects of organisations as a whole ... this process is made the subject of specialised responsibility of executives or leaders. The (executive) process is the sensing of the organisation as a whole and the total situation relevant to it. It transcends the capacity of merely intellectual methods, and the techniques of discriminating the factors of the situation. The terms pertinent to it are "feeling", "judgement", "sense", "proportion", "balance", "appropriateness". It is a matter of art rather than science, and is aesthetic rather than

logical. For this reason it is recognised rather than described and is known by its effects rather than by analysis'. (Barnard, 1938, p. 235)

Fayol (1949) suggested that executive work comprised five functions: planning, organising, commanding, co-ordinating, and controlling. Although subsequent researchers such as Mintzberg (1973) refuted Fayol's (1949) categories, others such as Hales (1986) and Stewart (1991) suggest these categories are enduring descriptions of the manager's work and make a useful list of necessary management activities.

Anthony (1964) built on these five functions and developed a hierarchical framework that explicated the nature of managerial work at different levels and, as discussed in Chapter 1, was used to define the term senior and to operationalise the definition.

Drucker (1979) pioneered the concept of management by objectives and the philosophy of the manager as someone who defines the organisational strategy, establishes performance measurements, motivates and develops people.

Whilst the classical schools management research tells us about the content and tasks of an executive it does not explicate how they carry out these tasks. Indeed, Barnard (1938) implies that the processes are opaque and ephemeral. To understand more about the form of management work one must look to schools of work activity and in particular those of Stewart (1967), Kotter (1982) and Mintzberg (1973).

3.4 Work Activities Schools

3.4.1 Stewart (1967)

Stewart (1967) found a common thread that ran through the work of most managers. Their day was characterised by long hours and fragmented work patterns, much of their day was spent communicating with others both within and outside their own organisations, and their work was varied in terms of content, tasks and location. She delineated five basic job profiles or roles.

'Emissaries' - spend much of their time outside the organisation meeting and dealing with outsiders, eg., sales people and senior managers who act as public figures. Their day is longer than others but less fragmented.

'Writers' - are managers who spend much of their time writing, reading, dictating memos and dealing with numerical work. They tend to be more solitary individuals by comparison to the other groups, work shorter hours and be less subject to day-to-day pressures. These are specialists and manage specialist departments, eg., directors finance and engineering.

'Discussers' - are the average managers who spend much of their time with other people and particularly their colleagues. They carry out a wide range of activities.

'Trouble Shooters' - spend most of their time dealing with crisis and fire fighting, eg., production managers. They have the most fragmented day, and spend much time with their subordinates and far less with their peers.

'Committee men' - spend much of their time in committee meetings. Their contacts are mostly inside the organisation and are vertical and horizontal. Stewart (1967) found this role was exclusive to managers in very large organisations, eg., public utilities.

Stewart's (1967) study shows the characteristics of managerial work in terms of the activities they undertake, but less in terms of the content. Indeed, she explicitly said she was not attempting to elicit such information as this could not be defined so unambiguously.

3.4.2 Mintzberg (1973)

Mintzberg (1973) suggests one needs to investigate both the content and the characteristics of managerial work and that taken in conjunction with the purpose of the content one can then formulate statements about the 'functions' or roles which managers perform.

Based on in-depth observations of five senior executives he found that executives work at an unrelenting pace and that their work was characterised by 'brevity, variety, and fragmentation' (Mintzberg 1973, p. 31). He noted the executives he observed performed a number of routine duties; used aggregated information and favoured verbal and informal methods of communications such as meetings rather than the more formal methods such as documents. Moreover, as Carlson (1951) and Stewart (1967) had earlier observed, executives' work comprised a

series of short discontinuous activities and fragmented activities. These observations Mintzberg (1973; 1989) suggests are hardly the activities and behaviours which underpin the tasks outlined by the classicists such as Anthony (1964) and Fayol (1949).

Mintzberg (1973) suggests that the nature of managerial work can be better explained in term of the roles performed. He suggests that executives are vested with formal authority over their own organisational unit (ie., division or business unit). From this formal authority come status, which leads to various interpersonal relationships, and from these comes access to information. Access to information in turn enables the executive to make decisions and develop strategies for their organisation. He defines a set of ten distinct roles which are divided into three groups.

In the descriptions which follows, the word organisation is used to imply the business unit for which the executive is responsible. This may be either the organisation as a whole, or a self-contained business unit, eg., the sales function. There seems to be no reason to differentiate the two for the purposes of this discussion, and indeed Mintzberg (1973) makes no mention of such differences.

3.4.2.1 Mintzberg's (1973) Executive Roles

Interpersonal Roles

'Figurehead' - the role every executive must perform as head of an organisation. It involves performing a number of routine, and often obligatory, duties and functions of a legal and social nature, eg., presenting awards, attending functions.

'Leader' - the formal leadership role in which the executive is responsible for motivating and activating their subordinates, setting the role model, and creating the culture of their organisation. Activities involve hiring and firing employees, negotiating, motivating, training, and other related staff duties.

'Liaison' - the executive is establishing their personal network of contacts and information providers, both internal and external to their organisation. They may call upon these contacts whilst performing other roles, eg., monitor and negotiator.

Informational Roles

'Monitor' - the executive is seeking information from a variety of sources (internal and external) about their organisation in order to develop an understanding of the organisation and its environment.

'Disseminator' - the executive is communicating information (internal and external) to other members of their organisation (more often than not to subordinates). There are two forms of information, factual and value. Factual information can be tested and validated as correct or incorrect. Value information relates to their personal beliefs and preferences about what the organisation 'ought' to be, and is therefore neither correct nor incorrect and more open to interpretation.

In the case of both the monitor and disseminator the executive may be seen as the nerve centre.

'Spokesman' - the disseminator role is about communications inside the organisation, whereas the spokesman role is about communications external to the organisation in order to satisfy the needs of others in a position to influence the direction of their organisation, eg., financial institutions and government. Often in this role the executive is acting as the expert about their organisation's activities. The spokesman and disseminator roles are related to the figurehead role and one could argue result from being seen as the figurehead.

Decisional Roles

'Entrepreneur' - voluntarily the executive is searching the organisation and its environment for opportunities to develop the organisation and bring about change. Ideas garnered in the monitor role often come into play in the entrepreneur role.

'Disturbance Handler' - involuntarily the executive is searching the organisation and its environment in order to resolve a problem which is unexpected but which cannot be ignored, eg., settling a dispute involving a key client or supplier.

The entrepreneur and disturbance handler roles can be viewed as opposite ends of a continuum on decisions which run from wholly voluntary and innovative decisions at one extreme (what might be called entrepreneurial), and at the other

extreme involuntary reactive ones (which are crisis and disturbance related). What are commonly called 'problems are somewhere in the middle' (op. cit., p. 77).

'Resource Allocator' - the executive is allocating the organisations resources (manpower, time, finances, information and material), and thus deciding which projects go ahead, and which do not. Mintzberg (1973, p. 85) suggests that this role 'is at the heart of the organisation's strategy-making system'. There are three aspects to this role: scheduling the executive's own time, programming work and authorising decisions. How and to what the executive allocates his own time are again setting the priorities of the organisation and seem closely allied to the leadership role. The more he emphasises the programming of work and authorising decisions the more he must personally remain involved and hence he creates fewer opportunities to delegate.

'Negotiator' - Mintzberg (1973) believes that negotiation is a key aspect of any executive's work. As figurehead and spokesman the executive will find themselves *de facto* required to perform the role of negotiator when their organisation is involved in major negotiations with internal or external organisations.

Of the ten roles, Mintzberg (1973) suggests that if they could be isolated, the most important are those of leader, liaison and disturbance handler, yet these are the least well understood.

3.4.2.2 Mintzberg's (1973) roles, functions and jobs

Mintzberg (1973) observed that the emphasis placed on a role may also depend on the manager's function (eg., marketing, operations, personnel), his level and his time frame for making decisions. For example, managers at lower levels tend to be more focused on 'real-time' issues, that is day-to-day decisions to keep operations running smoothly. The emphasis is therefore more likely to be on the disturbance handler and negotiator roles. More senior managers will tend to focus on more strategic issues and therefore emphasise the figurehead and entrepreneurial roles.

In terms of functional variations, Mintzberg (1973) builds upon Stewart's (1967) research and identifies three broad functional groups, as shown in Table 3.2.

Table 3.2 Functions and Roles

Function	Role Emphasis
Line production manager	Decisional, and especially the disturbance handler
Line sales manager	Interpersonal, especially liaison and figurehead
Staff specialist managers, eg., finance, MIS and personnel	Monitor and spokesman

The staff specialist often needs to be both a manager and an expert and often his power and authority as a manager are gained as a result of his expertise. From this he identifies eight managerial types, which are described in the following paragraphs. For each managerial role he suggests certain roles are 'more prominent' (p. 127), as shown in Table 3.3.

Table 3.3 Managerial Types and Key Roles

Managerial Type	Key Roles
Contact man	Liaison, figurehead
Political manager	Spokesman, negotiator
Entrepreneur	Entrepreneur, negotiator
Insider	Resource allocator
Real-time manager	Disturbance handler
Team manager	Leader
Expert manager	Monitor, spokesman
New manager	Liaison, monitor

'Contact Men' - spend most of their time outside their organisations dealing with people who can help them by doing them favours, placing orders with them, etc. Additionally, these executives expend much of their energy developing a reputation for themselves and their organisations. Sales managers often fit this role.

'Political Managers' - also spend much of their time outside their organisations but for a different purpose, and often not through choice. Theirs is to reconcile diverse political forces acting on their organisations. Mintzberg (1973) suggests this is a typical job for executives in government agencies, eg., the NHS, and this author suggests privatised public utilities.

'Entrepreneurs' - spend a large proportion of their time seeking opportunities and implementing change in their organisations.

'Insiders' - are concerned chiefly with the long-term maintenance and smooth-running of the internal operations of their organisations; typical examples might be the operations, finance or personnel directors.

'Real-Time Managers' - like the insiders are focused on the smooth-running of internal operations but from a day-to-day perspective. Typically they might be the number two in operations, finance or personnel.

'Team Managers' - too have an internal orientation but they are concerned with building the teams that will function effectively as one.

'Expert Managers' - carry out work which may constitute either a job in itself or added on to one of the other jobs. Here managers are performing as the functional experts. For example, in some organisations the finance director also undertakes specific tasks such as managing the treasury function. They are similar to Stewart's (1964) 'writers'.

'New Managers' - as the title suggests, are the newly appointed managers and as such may not have established networks of contacts in place, and will initially need to concentrate on establishing these. Once this is done they may stress the entrepreneurial role as they attempt to put their stamp on their organisations.

Mintzberg (1973) found that, regardless of role and job, executives preferred to collect their information through the oral media and preferably face-to-face communications, with the phone as second choice.

3.4.3 Kotter (1982)

Kotter (1982) too noted from his study of fifteen general managers that there was a gap between what the classical text said executives should do and what happened in reality. He too suggests the actual behaviour of managers is less systematic, less reflective, less well organised, and more frivolous than the textbooks would have us believe. Kotter (1982) found the tasks most central to effective general managers were those of agenda setting and networking. Whilst general managers would be following the formal organisational agenda they would also be setting, developing and pursuing their own agendas. The two agendas would usually be congruent in terms of goals, but different in terms of time frames and formality. The general managers' own agendas were more

informal, less well documented, and covered broader time spans than those of the organisation.

The network provided a means of gathering information and developing relationships which they could subsequently use to implement their agendas. Kotter (1982) observed that early on in a job there was a strong emphasis on developing the network whereas later the emphasis was on making it work. He also suggests the quality of this network influenced managers' performances through contribution to and implementation of an agenda. He too noted the fragmented nature of their work and preference for the less formal oral mode of communication. Kotter's (1982) findings are consonant with Kanter (1977), who observed the importance of networking, and managers' preference for oral communications, and that their need to 'win acceptance' and 'communicate' was often more important than any substantive knowledge of the business.

3.5 Decisional, Leadership and Greatman Schools

These schools of thought have made a significant contribution to the understanding of the nature of managerial work, and especially in terms of how managers make decisions and chief executive officers lead their organisations. However, for the purpose of this study the work activity and intellectual schools of management were felt to be the most helpful. Where appropriate, specific mention will be made to the work of the relevant authors in these other schools.

3.6 Summary of the Content and Activities of Managerial Work

Although on the surface it looks as though executives do not perform the classical functions of planning, co-ordinating and commanding, it could be argued that they are in fact doing some of these functions, but by less obvious and more subtle methods (Carroll and Gillen, 1987; Hales, 1986; Weick, 1983). For example, from Mintzberg's (1973) study, the roles of monitor and resource allocator imply the need to control, co-ordinate and command. Within Kotter's (1982) study too, there are strong elements of planning and co-ordinating in order to execute an agenda.

Hales (1986) reviewed six studies of managerial work including those of Kotter (1982) and Mintzberg (1973), and identified nine common behaviours and activities, as shown in Table 3.4. To a large extent the first seven tasks correlate

with Mintzberg's (1973) roles, whilst the last two, as Hales (1986) himself points out, closely resemble the classical functions identified by Fayol (1949). Mangham and Pye (1991) interviewed 47 senior executives from 13 top UK companies in an attempt to identify more closely the processes involved in executive work. They identified organising, leading and implementing change as the core processes.

Table 3.4 Hales's (1986) List of Managerial Activities Compared to Mintzberg's (1973) Roles

Behaviour Identified by Hales (1986)	Comparable Mintzberg (1973) Role
1. Acting as figurehead and leader	Figurehead/leader
2. Liaison: forming contact networks	Liaison
3. Monitoring, filtering and disseminating information	Monitor/disseminator
4. Allocating resources	Resource allocator
5. Handling disturbances and maintaining work flows	Disturbance handler
6. Negotiating	Negotiator
7. Innovating	Entrepreneur
8. Planning	
9. Controlling	

3.7 Summary of the Characteristics of Managerial Work

Although there is some dissonance over the tasks and behaviours associated with executives' work there is, as indicated, considerable agreement about the characteristics of these tasks and behaviours. Based on the work of Kanter (1977), Kotter (1982), Mangham and Pye (1991), Mintzberg (1973) and Stewart (1967) executive work is characterised by:

- long hours;
- much of the working time being spent away from the office;
- many short encounters, often about unrelated topics;
- the need to handle large amounts of data which are often fragmented;
- extensive use of external sources of data;
- a preference for oral communications.

As indicated, these characteristics are to some extent incongruent with the notion of rational thinking and planning. Mintzberg (1989) goes so far as to suggest that executives do not act in a rational manner. Indeed, given such a busy schedule one might ask when executives have time to think, and what they think about when they do think. Kotter (1982) provides some insight with his notion of agenda setting. To gain a further insight into how the behaviours and tasks which are executed are done within their operating environment one must look at the cognitive process managers go through.

3.8 Managers' Cognitive Processes - Intellective School

There has been quite a lot written explicitly about managerial thinking (for example, Srivastva (1983)); two of the most frequently cited writers on this subject have been Isenberg (1984) and Weick (1983; 1985). Weick (1983) and Isenberg (1984) propose that executives are continually thinking, and that their thought and action are inseparable.

3.8.1 Weick (1983; 1985)

Weick (1983) suggests that thinking is neither an action nor a behaviour in itself. A part of the problem about whether or not managers think is the use of the word think as a verb. It should be regarded as an adverb which 'requires that some other activity must be underway if thinking is to occur' (p. 225). 'Managerial actions of any kind can be done more or less thinkingly' (p. 223). Thus thought occurs in the context of action. He goes on to propose that 'acts done thinkingly have a distinctive form' (p. 224).

> '... thinking intensifies activity. Action takes on more significance, becomes strengthened, and has more consequential effects, the more resonance that is established between it and some explanation. ... Actions done thinkingly have a distinctive form. ... Thus to assert that people act more or less thinkingly is not just to say that the form of the action creates relationships and covariations that did not exist before the action occurred. When managers act thinkingly, they create a different environment than when they act unthinkingly' (Weick, 1983, pp. 224 - 225).

Thinking actions are done with attention, intention, and control, whereas actions done unthinkingly are carried out on impulse, without sensitivity to the surrounding environment, and within a rigid framework. This concept of thinking actions is supported by the observations of Mangham and Pye (1991, p. 19), who explicitly state that certain managers in their survey were seen to act thinkingly. Weick (1983) acknowledges that whilst thought may proceed action, it is not the detailed analytical sort in which different options are tested. Rather it is about how to create order out of a seemingly disordered and disconnected set of issues. He suggests that often the situations faced by senior executives contain gaps and discontinuities, and what the executive is trying to do is bridge these gaps, and make 'sense'.

Weick (1985) proposes that managers make sense of their world by using a variety of processes which include five which he terms 'effectuating', 'triangulation', 'affiliating', 'deliberation' and 'consolidation'. Effectuating refers to the learning about the environment by probing and prodding and observing the consequences of these actions. Triangulation is applying different measures to the same set of data. Affiliating is the process of comparing what one sees and one's associated interpretation to another person's observations and interpretations of the same event. Deliberation is about learning through slow and careful reasoning.

3.8.2 Isenberg (1984)

Isenberg (1984) studied twelve senior executives and found the focus of their thinking related to two connected topics - how to create a more effective organisation, and how to deal with one or two overriding concerns - and that their preoccupation with these topics can 'persist for anywhere from a month to several years, and in effect, dominated the manager' (p. 84). Isenberg (1984) also posits that although managers' thought processes rely heavily on their intuition, this intuition is in fact based on experience. Just as skilled craftsmen and professionals perform tasks and identify where and when problems may occur without seeming to think about what they are doing, so the senior executive acts in a similar manner. He suggests intuition is not the opposite of rationality, and proposed five ways in which executives use their intuition:

> '... to sense when a problem exists; to perform well-learned behaviour patterns rapidly; to synthesise isolated bits of data and experience into an integrated picture; as a check on the results of a more rational analysis; and to bypass in-depth analysis and move rapidly to come up with a plausible solution' (pp. 85 - 86).

Isenberg (1984) says that when thinking about their portfolio of problems executives are constantly looking to define the real problem, that is the problem which causes all these smaller problems. Once they have identified the real problem the executive then maps out the network which connects all the other problems. These cognitive processes of developing mental maps and networks proposed by Weick (1983), Isenberg (1984), and Mintzberg (1973) are consistent with Kotter's (1982) concept of the agenda.

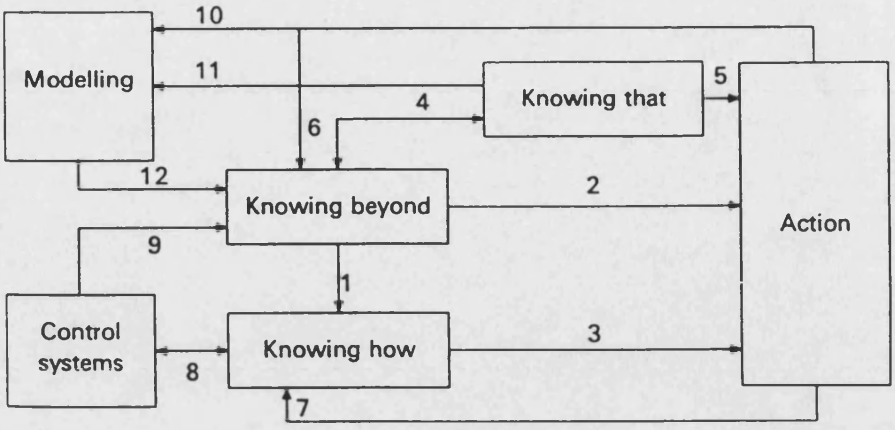
As Isenberg (1984), Kotter (1982) and Weick (1983) indicate, these issues (problems) are often only loosely connected, with no clear right or wrong solution. One danger is therefore that having developed a solution the executive goes on to seek only data which will reinforce their chosen solution. However, as indicated, Isenberg (1984) suggests the successful executive is in fact continually seeking out data (usually about the external environment) which will indicate a need to change the network and associated solutions (a view supported by Herriot and Pemberton (1995), as discussed in the next section). Isenberg (1984) suggests it is during this phase that managers will use the more analytical and rational type of data produced by computer systems such as executive information systems. The fact that there are often several solutions to the problem, none of which is intrinsically right or wrong, underlines the high degree of ambiguity and uncertainty with which executives have to cope, and to some extent thrive on (Kotter, 1982; Mintzberg, 1973; Stewart, 1967).

Isenberg (1984) notes that one implication of the thinking/acting cycle is that, having perceived a problem, the act of going and asking for more information often changes the nature of the problem, because those asked for information may then perceive a problem and change accordingly. He also noticed that the managers in his study often acted in the absence of clearly specified goals, rather letting these emerge from the process of clarifying the problem.

3.8.3 Herriot and Pemberton (1995)

Herriot and Pemberton (1995, p. 4) recently proposed that there are three sorts of 'knowing': 'knowing how', 'knowing that' and 'knowing beyond'. Knowing how, is what most people think of as knowledge. It is the expertise to solve particular sorts of problems on the basis of past experience with no reference to the current, let alone future operating environment. Knowing that, is about solving problems in the light of past and present experiences, with a recognition that the information available is already out of date. In both cases problems are made to fit the available solution. Knowing beyond, means developing a vision about what the future might be and how the present might be transformed into a set of radically different activities. New solutions are created to fit the problem. The three states of knowing are related, as shown in Figure 3.1.

Figure 3.1 Herriot and Pemberton's (1995) Model of 'Knowing'



Note: the numbers indicate the relationships between each component of the model

Knowing beyond without knowing how and knowing that can be disastrous. (For example, Herriot and Pemberton (1995) assert that the Prudential Assurance Company's acquisition of estate agents was built purely on knowing beyond.) Conversely effective knowing may be built on knowing beyond, which means the 'present may be examined from the perspective of knowing beyond more fruitfully than from the perspective of knowing how' (p. 154). This relationship suggests one 'is not only set on doing something differently or better. We are also concerned with how we think about our actions and their consequences. Do we reflect on how we are doing things as well as on what we are doing (p. 155)?' They posit that it is the knowing beyond which is important and differentiates the 'expert' general managers from the rest.

> 'There are expert general managers and there are journeymen. What is the nature of the expertise which distinguishes them? We will argue that the expert managers "know beyond" much more frequently than they "know how"... they express this knowledge in action. These actions which embody knowing beyond are usually more important than those which reflect know-how' (Herriot and Pemberton, 1995, p. 23).

In Herriot and Pemberton's (1995) notion of knowing beyond, as in Isenberg's (1984) paper on executive thinking, one sees parallels with Popper's (1973) philosophy of deduction, rather than induction and the concept of falsification being the criterion which distinguishes genuine enquiry and sense making from nonsense, and the ability to discover and innovative. In some ways too there are parallels with the concept of knowing beyond and the concept of 'double-loop learning' (Argyris and Schon, 1980) where one re-examines one's theories in use in the light of the resulting actions rather than continuing with the same tried and tested behaviour regardless of any changes in circumstances.

Herriot and Pemberton (1995) also distinguish between the mental frameworks of the work of the general managers (eg., managing directors of business units) and the professionals (eg., the finance and production directors), as summarised in Table 3.5. The professional is akin to Stewart's (1967) 'writer' role and Mintzberg's (1973) 'expert manager' job and possibly even the 'real time manager'. Hales (1986) suggests executives perform both specialist/technical and general/administrative work.

Table 3.5 Mental Frameworks of the Professional and General Managers after Herriot and Pemberton (1995)

Professionals	General Managers
Work with defined problem areas	Work with unlimited problem areas
Use action knowledge and theory knowledge	Use action knowledge only
Gain esteem from fellow professionals	Gain esteem from satisfied stakeholders of the business, eg., shareholders and customers
Careers progression is based more on knowledge and expertise	Career progression is based more on power and responsibility
They seek the optimum solution to a problem	They seek a workable solution to a problem
They prefer rationality	They prefer justification and intuition

3.9 Zuboff's View of the Nature of Managerial Work

Zuboff (1988), as indicated in Section 2.11.4, suggests the use of electronics media requires a new set of skills which she calls 'intellective'. She posits that most models of managerial work (including those of Barnard, 1938; Kanter, 1977; Kotter, 1982; Mintzberg, 1973) emphasise the physical 'action-centred' skills and in particular their ability to 'act-with' their bodies to create their power bases. That is to say, executives use body language to command power and that this in conjunction with concepts such as the hidden agenda; and their preference for oral communications means they have maintained the 'opacity of their know-how' (p. 178) and the mystique of what they do whilst using the computer to make the work of their subordinates more transparent.

Whilst Barnard (1938) stressed that communications was the dominant executive function, Zuboff (1988) again feels this is an action-centred activity because for him there were only two components of organised communications - the means (the people) and the system (namely the position the people held in the organisation). Executive communication was expected to be largely oral, face-to-face and informal. In the case of Kotter's (1982) study, she feels the emphasis

placed on networking highlights the action-centred aspects of managerial work, rather than the use of 'systematic, formal planning documents' (Zuboff, 1988, p. 102).

Although Isenberg (1984) and Weick (1983) had shown that managerial work has its intellective component, it is very much the action-centre skills which Zuboff (1988) argues lie at its core. This is one reason, she posits, that some managers will have difficulty coping with the computer as a communications media as they are unused to using anything other than their action-centred skills to achieve their goals, because despite all the rationalisation that has happened to the work of senior managers, they have maintained their ability to act-with their bodies. She also proposes that as 'intellective' skills require one to be able to translate raw data into information, and the information into insight (what Herriot and Pemberton (1995) call knowing beyond), some managers may find this hard and hence may shy away from electronic media and remain 'chauffeured users' (Culnan 1983).

3.10 Context and Specificity of Managerial Work

Mintzberg (1973) has little to say about the specificity of the executive's job either to one particular organisation or a market sector. Luthans *et al.*, (1985), Kotter (1982), Stewart (1991) and Whitley (1989) found evidence to suggest that effective managers have a detailed knowledge of their industry and organisations, and that the tasks they perform are closely linked to the organisational context and cannot easily be abstracted from them.

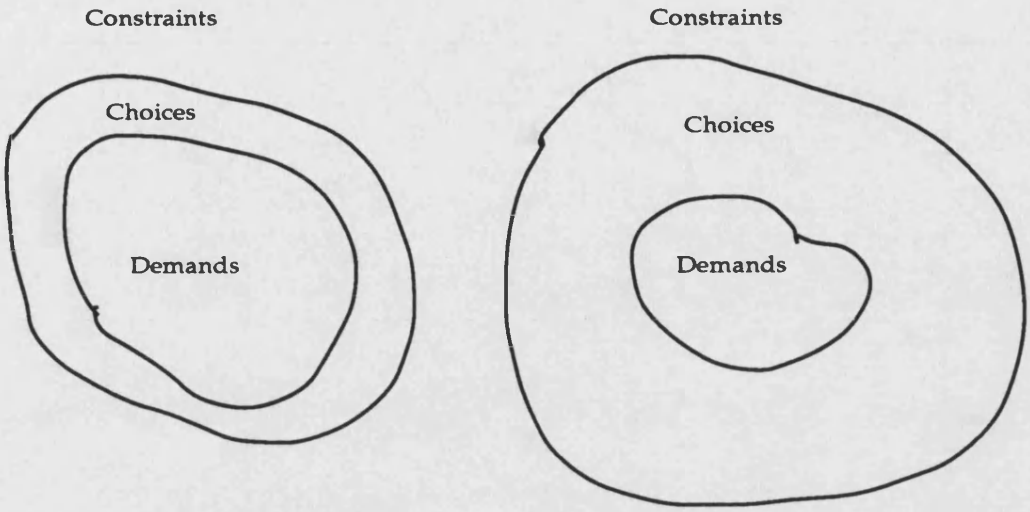
3.10.1 Demands, Constraints and Choices

Fox (1980) posited that:

> 'top management is in a privileged position inasmuch as its role is so diffusely defined that, given its command over resources, it has wide scope for shaping the normative system to accommodate its own aspirations' (p. 83).

Stewart (1982; 1991), in her study of the work of managers in seemingly similar jobs, found that they in fact did very different jobs and devised her demands, constraints and choice framework, shown in Figure 3.2, as a starting point to explore the differences.

Figure 3.2 Stewart's (1982) Framework of Differences in Demands, Constraints, and Choices as Perceived by Two Different Managers



Manager A's perception of the job

Manager B's perception of the job

> '.. there is a core of work, labelled "demands", that anyone in the job will have to do; these tasks are the tasks that cannot be ignored or delegated if the jobholder is to survive in the job. ... These are the minimum demands inherent in the job, but some individual jobholders may take on more. They may be risk adverse and so think they must do everything that is asked for. ... they may create their own demands. ... "Constraints" are the factors that limit what the jobholder can do: they include resources, limitations and people's attitudes. ... "Choices" is not another word for discretion. Discretion is an allotted area of freedom, like the discretion to authorise small capital work up to a certain figure. "Choices" are the opportunities that exist in the job for one jobholder to spend their time doing different work from that of another jobholder; this may just mean paying more attention to some tasks than others... (Stewart, 1991, pp. 14 -16)

The reasons why the manager should choose to emphasise different aspects of their work must surely also depend to some extent on their underlying and enduring psychological preferences for dealing with the world. The influence of personality is dealt with in Section 3.12.

One could argue that given the discretionary nature of their work, the context, and in particular the organisational culture, within which a senior executive works may have limited influence over how they work. Indeed the influence of the organisational culture on the use senior executives make of computers is equivocal, as discussed in Chapter 2.

Organisational culture is developed over many years and may supersede the arrival of an executive. As such there are several issues about the culture and context within which senior executives work which may be relevant to this study.

- What influence does the organisational culture have on the nature of managerial work?
- What is the effect of the external influences which are changing the nature of organisations?

3.10.2 Influences of Internal Organisational Culture

Lewin (1938) proposed that an individual's behaviour was a function of his personal attributes and his environment. Subsequently, both the Theory of Reasoned Action (Fishbein and Ajzen, 1975) and the theory of Behavioural Intention (Triandis, 1971) posited that social norms play some part in influencing a person's behavioural intention and hence behaviour. With respect to the use of computers there is mixed evidence about the influence of the organisational culture, as discussed in Section 2.3.1.1.

From a pure management perspective there is evidence that the organisational culture has some influence on the nature of managerial work (Handy, 1981; Hofstede, 1991; Katz and Kahn, 1978; March and Simon, 1958; Morgan, 1986; Schein, 1992a; Weick, 1979). The influence of culture is complex, as summarised in the following quote from March and Simon (1958), which although it was written in relationship to decision making encapsulates the complexity of the issue.

> 'The organisational and social environment in which the decision maker finds himself determines what consequences he will anticipate, what ones he will not; what alternatives he will consider, and what ones he will ignore. ... The theory of rational choice put forth here incorporates two fundamental characteristics: (1) choice is always exercised with respect to the limited, approximate, simplified "model" of the real situation. We call the chooser's model his "definition of the situation". (2) The elements of the definition of the situation are not "given" - that is, we do not take these as data of our theory - but are themselves the outcome of the psychological and sociological processes, including the chooser's own activities and the activities of others in his environment.' (March and Simon, 1958, p. 139)

Thus one sees a model of the executive constructing his own map and sense of the culture (Weick, 1990a; 1995) and elements of Isenberg's (1984) motion that executives only solve problems they feel they know how to solve.

3.10.3 Organisational Culture - Definitions and Frameworks

Whilst March and Simon's (1958) concepts of choice and Stewart's (1982; 1991) demands, constraints and choices framework are useful for understanding how the organisational culture can influence managers' choices, one is still left with such questions as the following.

- What do we mean by the term culture?
- What different forms of culture are there?
- How does one observe the culture of the organisation?

There are, of course, many definitions of the term organisational culture (for example, Handy, 1981; Hofstede, 1991; Morgan, 1986; Schein, 1992a). The work of Handy (1991) and Schein (1992a) has been used by others (for example, Fisher, 1992; Martin, 1988) and was found to be the most helpful to this author from two perspectives. Firstly, for providing guidance on the different types of organisations to include in the study so that a mix of organisational culture could be included, and secondly in terms of a definition which could be operationalised.

3.10.3.1 Handy's (1981) frameworks of organisational cultures

Grounded on his observation of organisations, Handy (1981) identified four organisational cultures based on how things are done, resources are managed and allocated, the priorities of the organisation, the people employed, the products and services produced, and how the employees are looked after.

Power culture - this is an entrepreneurial culture, whose structure is best described as a web, with a central source of power at the centre of the web. Organisations which exhibit this culture work on precedent, control is exercised by the centre, and it is a political organisation, where decisions are based on the balance of influence rather than on procedural or purely logical grounds. Examples of such power cultures would be high technology organisations, and large conglomerates.

Role culture - otherwise know as bureaucracy. The organisation is co-ordinated and managed by a group of senior managers who sit at the top of the pyramid akin to Anthony's (1964) structure of organisations. Position power is the major source of power. Role cultures can be slow to change even when there is an imperative to do so. However, they often offer their employees a high level of job security and predictability. Classic examples of such cultures are banks, insurance companies, and government agencies.

Task culture - the job or project in hand is the focus for task driven cultures. Its structure is best described as a 'net' with some strands of the net being thicker and stronger than others. Much of the power lies at the interstices of the net, and networking plays an important part in these organisations. The emphasis within these cultures is on getting the job done. Influence is usually based on expert power and so task cultures are flexible and sensitive to their markets and customers needs.

Person culture - these are rare as the emphasis is on the individual as the focal point and their expertise, and therefore their organisational structure is minimal and designed to meet the needs of the individuals therein. A classic example is the American organisation 3M. Control mechanisms and management hierarchies are minimal and most decisions are taken by mutual consent.

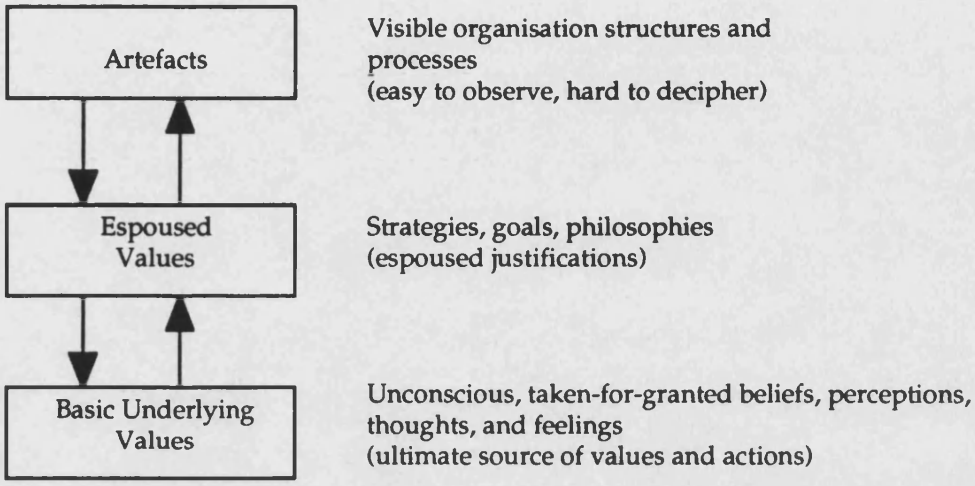
Handy (1981) suggests that there is a tendency towards the role culture which emphasises control and conformity. This is especially the case as organisations become large. Bartlett and Ghoshal (1995) posit that for organisations to survive in the 21st century, there must be more emphasis on the person culture which can foster bottom-up initiatives, and cite 3M and Canon and Intel as exemplars of such cultures. Clearly, as indicated within any one organisation, several sub-cultures can exist which may not be the same as the organisation's main culture. For example, within an organisation whose overall culture is a role culture, the marketing department, may be more task oriented, whereas the sales function might be more of a person culture.

3.10.3.2 Definition of culture - Schein (1992a)

Schein (1992a) suggests there are three levels to the organisation's culture - the artefacts, the espoused values, and the basic underlying assumptions - as shown in Figure 3.3. In a study such as this, one is only likely to be able to observe the

surface level artefacts (eg., the buildings, and the phenomena that one sees, hears and feels whilst in the organisation) and maybe the parts of the espoused values such as the goals and strategies.

Figure 3.3 Schein's (1992a) Levels of Culture



3.11 External Influences - The Changing Shape of Organisations

As intimated in Section 1.1.2, there are a number of external pressures and market forces such as the economic, social, political and indeed technological factors which are having an influence on the culture and structure of organisations (Bartlett and Ghoshal, 1994; 1995; David and Malone, 1992; Drucker, 1991; 1993; Fulk and DeSanctis, 1995; Fulk and Steinfield, 1990; Handy, 1994; Herriot and Pemberton, 1995; Katzenbach and Smith, 1993; Kanter *et al.*, 1992; Mitroff and Linstrone, 1993). Interestingly, in the 1993 edition of her book *Men and Women of the Corporation,* Kanter (1993) adds an afterword about the changing shape of organisations and the impact this is having on managerial work which encapsulates many of the changes predicted by other authors. Kanter (1993) lists six shifts of emphasis which she foresees affecting corporate jobs and careers (pp. 290-291):

- from fat to lean - the move from, fat is better, to small is beautiful and more flexible;
- from vertical to horizontal - more work is done across either functions or departmental project teams;
- from homogeneity to diversity - the workplace increasingly contains teams of people with diverse backgrounds and expertise;

- from status and command rights to expertise and relationships - professional expertise will underpin respect, leadership and influence rather than position;
- from company to project - the new organisation is characterised by a loyalty to teams and projects rather than the total organisation;
- from organisational capital to reputation capital - today people rely more on their own personal portfolio of expertise to move up the career ladder rather than expertise accumulated just within one organisation.

3.12 The Manager as an Individual

3.12.1 Rounding Out the Manager's Job - Mintzberg (1994)

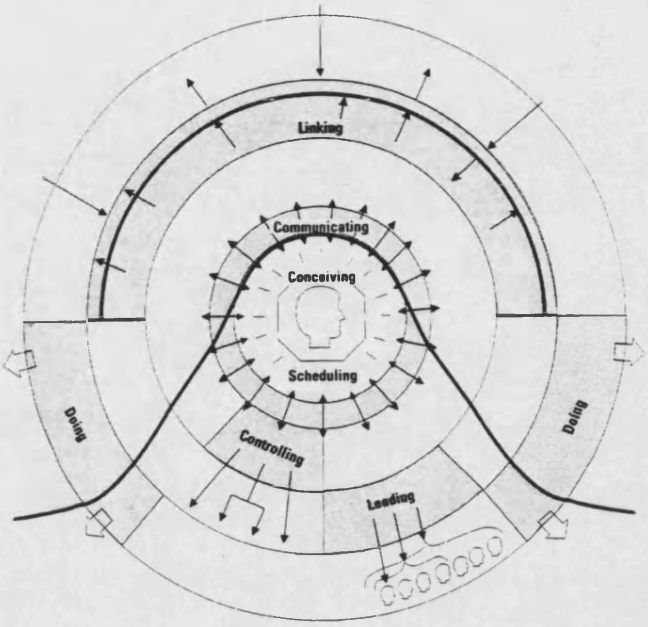
So far little has been said about the executive as an individual with his own set of attitudes and beliefs, although March and Simon (1958) and Stewart (1982; 1991) alluded to it. Mintzberg (1994) suggests the integrated picture of the individual in a job has been lost in the formal literature due to the intense focus on specific aspects of management such as leadership and decision making.

> '... individuals come to a managerial job with a set of *values*, by this time probably rather firmly set ... they also bring a body of *experience* that, on the one hand, has provided a base of knowledge. ... That knowledge is, of course, used directly, but it is also converted in to a set of *mental models*, key means by which managers interpret the world around them. ... Together all these characteristics greatly determine how a manager approaches a given job - his or her *style* of managing' (Mintzberg, 1994, p. 12).

In some ways there is nothing new in what Mintzberg (1994) is saying, for as Isenberg (1984), March and Simon (1954), Stewart (1982; 1991) and Weick (1983; 1995) posited, managers are continually trying to make sense of what is happening and making decisions based on their perceptions of the issues in hand. What Mintzberg (1994) is trying to do is to synthesise these different ideas in to one model which encompasses the manager as an individual, the job and agenda for the job as he perceives it, as shown in Figure 3.4. He proposes the manager then engages in the job through the cerebral roles of conceiving and scheduling which he feels are at the core of managers' roles for getting things done. There are three levels of action for executing these roles: first through direct action which they themselves take, and which he sees as the outermost level; second through people (leading) encouraging them to take the necessary

action; and third through information (communicating) to influence people to take action.

Figure 3.4 Mintzberg's (1994) Rounded Out Model of Managerial Work



Mintzberg (1994) acknowledges the extent to which a manager chooses one or other of the levels of action will depend on their individual style although in keeping with Zuboff (1988) he observes a preference for action, but in terms of Weick's (1983) concept of insightful action as discussed in Section 3.8.1. However, he does not delve into why individual managers choose different styles, although he acknowledges that style is developed from previous experience and beliefs. As Ajzen and Fishbein (1980) demonstrated, beliefs are formed from variables such as the individual's demographic data, personality and their attitude to the issue in question.

3.12.2 Demographic Data

Ajzen and Fishbein (1980) suggest a range of demographic factors which can influence beliefs, such as age, gender, education, professional education, religion, ethnic origins and marital status. In keeping with other studies on the nature of managerial work (eg., Mintzberg, 1973; Stewart, 1967; 1982; Kotter, 1982) and MIS (eg., Ein-Dor and Segev, 1988; 1991; 1992; Igbaria, 1990; 1993; Martin, 1988), only the more readily accessible ones which can be quantified will be considered

in this study, such as age, educational and professional qualifications and work experience, eg., length of time with the organisation and the current job.

3.12.3 Personalities - The Myers-Briggs Type Inventory

Individuals have individual personalities and, whilst there are many schools of thought on how these are developed, measuring an individual's personality can be fraught with problems (Anastasia, 1976). One of the most enduring models is that of Jung (1923). He asserted that people have preferred modes of perception (sensing (S) or intuition (N)), judgement (thinking (T) or feeling (F)), and being energised (extraversion (E) or introversion (I)). Based on Jung's bipolar constructs, Myers (1962) added a fourth dimension, a person's preferred orientation to the outside world (judging (J) or perceiving (P)), and developed the Myers-Briggs Type Inventory (MBTI). A detailed exposition of the MBTI is given in Appendix A. This section provides an overview of the main premises of the MBTI and how they might influence managerial behaviour and use of computers.

3.12.3.1 Core Types

The perception and judgement dimensions are known as the core constructs of the MBTI and when combined lead to four 'core types' as outlined below (after Myers and McCaulley, 1985).

Traditionalists (ST) - they prefer to gather all the facts and consider them dispassionately in order to make a decision. They are good at coming to logical reasoned decisions and at dealing with the here and now and hence making the existing systems run smoothly. Nutt (1993) calls this the 'analytical' approach to decision making. STs are weak at dealing with change and situations which are subjective and involve people's feelings. This core type is akin to left brain thinking, what Mintzberg (1989) calls the 'cerebral' approach to management.

Visionaries (NT) - the T means they too like to be logical and analytical but prefer to apply their thinking to situations which require intuition and are best dealing with situations where there isn't much clear information. They will see the whole picture and are probably better at building new systems, and operating in an inductive manner, using 'thick management' approaches (Mintzberg, 1989) and an 'insightful style' (Mintzberg, 1984). NTs takes a 'speculative' approach to

decision making (Nutt, 1993). They are weak at dealing with detail and following through their ideas. They tend to avoid situations where the facts are established and they need to deal with people's feelings.

Catalyst (NF) - they focus on the people aspects and tend to enjoy developing their own and other people's skills and talents. Their strength is getting people to work together and handling complex people problems. They apply a 'consultative' approach to decision making (Nutt, 1993), but can be impatient when dealing with routine and tend to avoid making decisions which may cause conflict. This core type is akin to right brain thinking.

Loyalists (SF) - they tend to be pragmatists and will do whatever is needed to support a colleague or client. Their strength is compassion and concern for the common good and a focus on making the existing systems work harmoniously. They take a 'charismatic' approach to decision making (Nutt, 1993). They are often impervious to change especially in areas where they have worked hard, and they do not like making decisions which cause conflict.

3.12.3.2 Extraversion (E) and Introversion (I)

Everyone has both an extraverted and introverted aspect of their personality, but most favour one over the other. Those with a preference for extraversion (E) are energised by the external world, and prefer dealing with other people, activities and objects. Those with a preference for introversion (I) are energised by the inner world and centre on internal thoughts and ideas.

3.12.3.3 Judging (J) and Perceiving (P)

People have a preferred orientation towards the outside world, ie., for how they live, whether in an orderly planned fashion (J) or a more spontaneous and flexible lifestyle (P), and hence their attitude to how they make decisions. Those who prefer judging (J) in order to come to a conclusion will be seen as making a quicker decision. At some point they shut off and deem that all the evidence is in, and any more is irrelevant. Those who prefer perceiving (P) suspend judgement for as long as possible. They will be slower to make a decision for fear of making one which is irrevocable, and may appear as less interested in maintaining order and control in their lives.

3.12.3.4 Influence of the Dimensions in Work Situations

The overall effects of each dimension on a person's preferences in the work situation is summarised in Table 1 at Appendix A. There are sixteen individual profiles and for each, one of the core dimensions will be dominant, whilst the other will be the auxiliary function, as shown in Table 2 at Appendix A. A brief synopsis of the dominant profiles found in this study is given in Appendix A. The influence of a manager's MBTI may have implications for their disposition towards the use of the computer, as discussed in Section 3.17.

3.13 Managerial Effectiveness

As Hales (1986), Luthans *et al.*, (1985) and Martinko and Gardner (1985) point out, whilst much is known about the tasks, roles and processes related to managerial work, far less is known about whether or not these executives are effective. This begs the question, what is meant by effectiveness? Hales (1986, p. 88) says 'effectiveness donates the extent to which what managers do actually matches what they are supposed to do'. For Hales (1986) and Martinko and Gardner (1985) therein lies the paradox: they feel that there is insufficient clear evidence as to what executives really do to enable them to be determine what is critical for effective performance. Studies which claim to be about effectiveness, and in particular those of Kotter (1982) and Luthans *et al.*, (1985), appear to be more about seniority than effectiveness, as defined by Hales (1986), although, Kotter (1982) does make some attempt to categorise the effectiveness of the managers in his sample by comparing them to various economic indicators for the organisation. Nonetheless, being at the top does not in itself mean the executive is successful, as witnessed by the number of top executives who are either asked or forced to resign from time to time when their organisation is performing poorly (for example, Lord Young and James Ross of Cable and Wireless, Cedric Brown of British Gas and Trevor Newton of Yorkshire Water).

One of the difficulties of a study such as this is the need to remain impartial and non-judgemental. This is especially the case when dealing with managerial behaviour. There may well be a correlation between the manager's effectiveness and the use made of the computer. However, it is not the prime purpose of this study to judge how effective are the executives: that is a study in itself. This study will confine itself to the position the manager occupies as defined earlier using Anthony's (1965) framework, regardless of his effectiveness in that

position. The term 'top/senior' is therefore taken to indicate only position, and implies nothing about level of effectiveness and success.

3.14 Exclusivity and the Work of Senior Managers

A number of authors (for example, Hales (1986) and Whitley (1989)) have questioned which of the observed tasks and behaviours are exclusive to senior managers. Whilst accepting this as a limitation of the studies on senior managers, this issue cannot be addressed in this study. Rather, the tasks and behaviours of the managers interviewed are taken at face value regardless either of whether or not they are exclusive to their position in the organisation, or their effectiveness as executives.

3.15 Summary of the Nature of Managerial Work and Models Used to Guide this Research

At this stage, one is left with not one all-embracing model of managerial work, but rather a series of interconnecting models, each of which explains and informs us about some aspect of the nature of the work of senior executives. As Carroll and Gillen (1987) demonstrated, both the classical and interpretivist models of managerial work have something to offer, and in the light of the work of Mangham and Pye (1991) so too does the work of the post-interpretivist.

The work of Fayol (1949), Mangham and Pye (1991), Mintzberg (1973) and Stewart (1976) is largely about the tasks and functions performed by executives, that of Kotter (1982) explores the activities these executives undertake in order to perform these tasks and functions, and Isenberg (1984) and Weick (1983; 1995) shed light on the executive's thought processes. The need to take a pluralistic approach in the absence of a single 'grand unifying theory' has been demonstrated in the field of theoretical physics (Hawking, 1988; 1993). Whilst there is no unifying theory about the work of the senior executive, the consummate desire for data and the need to massage and manipulate that data to produce information is evident in each of the frameworks discussed in this section. Martin (1988), Rockart and DeLong (1988) and Isenberg (1984) amongst others explicitly suggest that given these characteristics of executive work any tool which can help the executive save time, and handle large quantities of information should appeal to the senior executive.

For this study, and for looking at the ways in which the senior executive might find it beneficial and productive personally to use a PC, the following works will be used. The classical models offer a starting point as to the functions which senior executives carry out and the content of their work which might support the use of a PC; Mintzberg's (1973) role models will be used to provide some guidelines about the different roles and tasks for which the use of a PC might be beneficial, while Kotter (1982) will be used to explore the activities associated with these tasks. The work of Isenberg (1984), Herriot and Pemberton (1995) and Weick (1983; 1995) will be used to examine the thought processes which could be supported by a PC. Handy's (1981) and Schein's (1992a) theories on culture are used to provide guidance on interpreting organisational cultures. Stewart's (1982; 1991) model of demands, constraints and choices, supported by data from the MBTI personality data, will be used for exploring individual differences, ie., why seemingly similar jobs can be executed quite differently by two managers.

3.16 Managerial Work and the Computer

Table 3.6 summarises the functions, roles, activities and processes where one might anticipate personal interaction and use of a computer, and in particular a PC, offers the senior executive some benefits. Within the classical functions the use of the computer for planning, organising, co-ordinating and controlling has been well documented at a functional and organisational level (for example, Cash *et al.*, 1992; Earl, 1989; Keen and Scott Morton, 1978; Rockart and DeLong, 1988) However, far less is known about how the senior executive might use the computer to support these functions at the personal level.

Based on his observations about the fragmented nature of executive work and the heavy reliance of soft aggregated data often from external sources, Mintzberg (1973) suggests that the computer has little to offer senior executives. These observations were made at a time when most systems were mainframe based and it was very hard for the executive who was not a computer professional to access, let alone manipulate, the data held in the system. As discussed in Sections 2.10 and 2.11, Boone (1991), Rockart and DeLong (1988) and Vandenbosch and Higgins (1995b; 1996) amongst others have shown that, contrary to this viewpoint, there are ways of supporting the work of the senior executive through the use of EIS and ESS. Given the more accessible nature of the PC, and the flexible and sophisticated ways in which they can now handle

data, it is suggested that in fact the computer and particularly the PC may offer support in certain roles at a personal level.

Isenberg (1984) suggests that whilst one cannot abandon the rational ideal, there are several ways in which one can help executives improve their thought processes, some of which lend themselves to support from a computer, such as:

- building more rational systems into the organisation, which both complements the manager's intuitive thinking, and frees them to deal with complex and less obvious issues;
- providing opportunities for the manager to 'hone' their intellectual skills by providing them access to a wide range of data sources;
- improving their mapping skills;
- enabling them to do more in less time.

Table 3.6 - Functions, Roles, Activities and Processes which might be Supported by the Use of a PC

Function [1]	Roles [2]	Activities [3]	Cognitive Process [4]
Planning	Leadership	Agenda setting	Problem solving (in particular, creating the problem network, finding solutions to the seemingly insoluble)
Organising	Liaison	Networking	Mapping
Co-ordinating	Monitor		Checking solutions are current
Controlling	Disseminator		Honing intellectual skills
	Spokesman		
	Entrepreneur		
	Resource allocator		
	Negotiator		

Notes

1. After Fayol (1949). 2. After Mintzberg (1973). 3. After Kotter (1982). 4. After Isenberg (1984).

Rockart and DeLong (1988) suggest some of these are areas where an EIS could be useful, and find evidence of them being used in these ways. As mentioned, Isenberg (1984) notes that executives often solve only those problems which they perceive are soluble. This leads one to suggest that any tool such as a PC which can be used to see if the seemingly insoluble is soluble may also be useful.

Turning to the activities carried out, as identified by Kotter (1982), networking might usefully be supported by a PC. For example, personal data relating to each contact could be stored, perhaps with reminders of actions promised and expected. Boone (1991) notes that at least one of the CEOs she interviewed was

specifically using database software in this way. Again, within the context of agenda setting, the PC could be used to help model and test ideas which form part of an executive's agenda.

Returning to the tasks which executives perform, there would appear to be plenty of scope for executives to use the computer to support themselves. Taking for example the monitor role, a PC could be used to store and manipulate data which could then also be used to model different scenarios when in the entrepreneur role. Mintzberg (1973) in fact places a strong emphasis on the use of mental models by executives and for which Rockart and DeLong (1988) and Vandenbosch and Higgins (1995b; 1996) have found executives use an EIS. The use of presentation software might be useful when the executive is performing the role of spokesman, whereas word processing could be beneficial in the disseminator role. Spreadsheet software might be used to support the role of resource allocator.

Martin (1988) was able to show how the different roles related to the adoption and in some cases subsequent non-use of DSS. For example, he found that adoption was linked to executives showing a strong preference for the leadership role at some point. Use might subsequently be discontinued when the manager was heavily into informational and decisional roles and the output from the DSS did not meet the need in these roles. Vlahos and Ferratt (1995), in a recent study of how managers in middle to large size corporations in Greece used computer based information systems showed that the managers found the systems most useful in supporting the resource allocator role.

Within the context in which executives work there would also appear to be opportunities for them to use a computer. For example, although they work long hours, much of this work is often done away from the office. Furthermore they often do much of their planning whilst they are away from the office. The portability of today's personal computers may offer benefits in these circumstances, especially applications which can support the cognitive modelling and networking processes.

3.17 The Influence of the MBTI and the Use of the Computer

As discussed in Chapter 2, Zmud (1979) posited that of the individual differences which influence the use made of an MIS, cognitive style was amongst the most

influential, an argument which is supported by the Theory of Reasoned Action (Ajzen and Fishbein, 1980). On the basis that beliefs are based on one's enduring personality traits, such as those measured by the MBTI, it is pertinent to conclude this section with a discussion on how these might moderate executives' use of the PC in the light of what we know about the nature of managerial work.

3.17.1 The Core Types

Mason and Mitroff (1973, p. 478) pointed out with respect to an MIS, 'what is information for one type will definitely not be information for another type'. They suggest for someone whose preference is for thinking (T) their first and instinctive reaction to dealing with an issue will be to formulate a model and associated rules to help them understand the issue. Moreover, for those with a 'very clear' preference for T, information will be 'entirely symbolic', that is, it will be derived from an abstract model 'devoid of any empirical content', whereas, for sensors the information will be almost entirely empirical, devoid of any theoretical content. Thus for an S who speaks of raw data, hard numbers and facts, to this person computer output should appeal. For the Ns, as indicated, information will be in the form of imaginative scenarios and sketches of future possibilities.

It has been shown that there is a tendency for scientists to have dominant S and T functions (Myers and Myers, 1992). Mason and Mitroff (1973) suggest that given that most MIS developers have a scientific background, the resulting MIS system will often lack any information which will appeal to those with a dominant N or F mode.

The difference in methods of perceiving and judging may be one of the reasons why so many MIS and EIS systems fail. Senior executives who have a tendency towards intuition (N) are less likely to find an EIS useful, as Agor (1985), Peters and Waterman (1982) and Roach (1986) and others found. Furthermore, as discussed in Section 2.11.4, Lilley (1992) and Weick (1985) posit EIS type software may disable an executive's creative ability. In order to make sense of what executives obtain from the computer they must move outside the system to set the data in context and interpret the meaning of the data. However, as Mitroff and Mason (1973) indicated, this may be hard for those with a preference for S and T. The former will take the data as it stands, whilst the latter will re-model the data, which just increases what Weick (1985) calls the 'senselessness' of the data.

Paradoxically Weick (1985) says that when dealing with electronic data, intuition is no longer of any value; rather one must be able to deduce the theory behind the data. Yet, as noted, intuition is the very strength of many senior executives' decision-making processes. Weick (1985) cites the use of spreadsheets to explain his point. On the face of it, spreadsheets look as if they can support the 'trial and error' method which he suggests is so important for learning and problem solving. In practice spreadsheets cannot accommodate random thoughts unless they fit the existing structures and models. Thus, whilst they may appeal to those with strong preferences for S and/or T, those with a preference for N and/or F may find them very frustrating.

Zuboff's (1988) 'intellective skills' imply a need for a combination of deductive and inductive reasoning which would be akin to the NT core type. Herriot and Pemberton (1995) suggest that to 'know beyond' too requires NT skills. However, again one has a paradoxical situation. Whilst one might expect those with a dominant and strong N in their core type, and especially the NTs to be better able to draw meaning from the computer, the very structured nature of such electronic data may inhibit them from doing so. Conversely, those who have an S or T as the dominant function, and especially the STs, may find electronic data more appealing and hence use the computer more extensively, but they may do so only within the context of 'knowing how' and 'knowing that' rather than 'knowing beyond' and therefore experiencing a 'cosmology episode' (Weick, 1985). That said, the focus of this research is on how and why executives use their PCs rather than the correctness of that use.

3.17.2 Individual Profiles

As Mason and Mitroff (1973) state, one rarely observes a 'pure' type, rather one sees a 'caricature' which reflects the person's combined preferences. Take for example an ESTJ. The ESTJ has a preference for hard facts (S) and logic (T) for perceiving and judging, action (E) and getting the task complete once the decision has been made (J). The objective output from the computer might therefore appeal. Also use of the computer might appeal as a means of executing a task quickly, eg., using e-mail to send a short communication. However, the ESTJ's impatient nature could mean they quickly become disenchanted with the PC, either if they cannot learn how to use it quickly, or when there is a problem. As indicated, there are no black and white situations, rather there are shades of grey depending on the strength of each of the dimensions. Nutt (1993) found

that those with the most flexible style were more aggressive decision-makers and were better able to tolerate ambiguity.

A detailed literature search was conducted to see if there had been any studies on the use of the MBTI and senior executives' use of the PC. The ABI Inform database was searched and the Centre for Applications of Psychological Type who licence the use of MBTI were contacted. Not unexpectedly, there were no explicit citations to such published work. There have been many studies on the use of the MBTI with children and their interaction with the computers, to assess programming abilities (see Pocius (1991) for an extensive review of this aspect of the use of the MBTI), and to look at differences in decision-making patterns (see Nutt (1993) and Roach (1986) for reviews). The MBTI has been used extensively with managers for management development (for example, Carland *et al.*, (1994) and Gardner and Martinko (1990; 1996)). Fisher (1992) used the MBTI in his study of middle managers and their use of computer-based information systems, but his findings were related more to areas of concern about such mainframe systems such as costs and the quality of the output, rather than actual use. The results of these studies are drawn upon as appropriate.

3.17.3. The Influence of Executives' MBTIs on their Use of the Computer

This section has provided an overview of how executives' MBTI profiles might moderate their use of the PC. As one might expect, the results of previous studies are equivocal, and probably need to be looked at in the context within which the executive operates and the roles he plays, rather than in isolation. Nonetheless, based on the studies discussed, one can speculate on some possible expectations as follows:

- NTs might be more inclined than STs to try out new packages and hence use a wider range of software than STs. The latter might be more inclined to adapt that with which they are already familiar, irrespective of its suitability.
- STs might therefore have a more in-depth knowledge of a smaller range of software, whereas NTs might have a shallower knowledge of a wide range of software.
- STs and might be more inclined to use the PC to support a decision they have already made, whereas NTs might be more inclined to use the PC to model other possible options.

- STs might be more inclined to use the PC to search for detailed data, whereas NTs might be more inclined to scan the data to see the whole picture.
- Is might use e-mail more than Es, although the expedient nature of e-mail would appeal to some types of Es, such as, ESTJ.

3.18 Summary

This chapter started by looking at the different schools of management and how each to a large extent focused on one or two aspects of the managerial role. Executive work is complex and no one school can provide all the answers. Rather one must eclectically pick bits from each model to provide a complete picture as to the content, activities, behaviours and context of executive work.

Senior executives have a high degree of latitude in what they do and how they do it; there are a number of variables which will undoubtedly influence their managerial style. Not least are their beliefs and attitudes which are formed from past experience and their individual personality traits. Whilst they may be seen as the guardians of the organisational structure and culture, the latter may be too well established for them to ignore completely the subjective norms of their organisations. The culture of their organisation too may influence what they do.

Some would suggest that given the content, activities and context of senior managers' work, the computer has little to offer them. However, others have shown this is not the case and that judicious use of the computer can help executives with certain aspects of their job. Clearly, given that executives do have a choice over which facets of their jobs they emphasise (roles, tasks and content), whether or not they use a computer, and how beneficial or otherwise they find this use may depend on which facet of their job they emphasise, and their underlying personal preferences for how they execute their jobs.

CHAPTER 4 - Research Methodology

This chapter describes the research design and techniques used in this study. The chapter commences with an overview of the main criticisms of MIS research methodology and in particular the use of qualitative techniques, and how these relate to this study and will be addressed in this study. The overall design and techniques used to collect and analyse the data for this research are then presented.

4.1 Introduction

The chapter on the nature of managerial work showed the complex, fragmented and at times ambiguous context within which senior executives work. They are often required to play several roles and undertake multiple tasks within the course of a day's work. The chapter on end-user computing showed the paucity of studies there have been both about the extent to which senior executives use personal computers to support them in their function, and within those studies how few executives appear personally to interact with the computer and why this is the case. Last and by no means least, of the studies which have been conducted into senior executives as end-users the results have been equivocal, especially those relating to the determinants of use and non-use.

As indicated in Chapter 1, some of the equivocality may result from the experimental design and research methods used. Equally, given the complexity and disparity of the work of the senior executive, it is perhaps not surprising to find this equivocality within results of such studies. Furthermore, one might reasonably question just how useful the personal computer could be to such an executive, although as indicated at the end of the previous chapter some ideas were generated based on the work of previous researchers in the fields of both MIS and management science. As indicated in Chapter 1, the focus of this research is on:

- how senior executives are personally interacting with computers;
- why they choose to do what they do;
- the processes they have gone through to develop their competence with the PC;
- the benefits they derive from their use;
- what are the drawbacks to making direct use of the PC.

The are four planned outcomes of this study.

1. Develop insights into how senior executives personally interact with PCs and how these uses fit with the more general models of end-user computing already documented in the literature.

2. Add to the literature on the executive use of computers.

3. Develop some descriptive and explanatory theories and models of executive use of PCs which are pertinent to the context of senior executives' roles and working environments.

4. Develop methodologies which other researchers and practitioners might use to anticipate, explain and evaluate the future use executives might make of the PC to improve both their personal effectiveness as senior executives and the effectiveness of their organisations.

This study was designed to look both at the quantitative aspects such as hard facts about the specific tasks for which executives use the PC and the type of applications they use, and the qualitative aspects such as the processes they go through to develop their expertise, and the context within which they work. That said, it is fundamentally a study about the hows and whys of the executives' use of computers. Just as any study on the nature of managerial work needs to take account of the context within which the executive works, so too should any study of their use of the computer (a point stressed by many previous researchers such as Boland and Hirschheim, 1987; Galliers, 1993; Galliers and Land, 1987; Kraemer and Dutton, 1991; Lucas, 1978; Lyytinen, 1987; Markus and Robey, 1988; Mason and Mitroff, 1973; Mumford *et al.*, 1985; Nissen *et al.*, 1991; Schultz and Slevin, 1975). Most of the studies on senior executives as end-users (with the exceptions cited in Chapter 2) have been questionnaire based with senior executives forming a small sub-sample.

As shown in Chapter 3 on the nature of executive work, there are differences in the work of senior and middle managers, and a critical issue for this researcher was to find a way of understanding the executive use of computers from the executives' perspective. A fundamental characteristic of the qualitative approach is 'its express commitment to viewing events, actions, norms values, etc., from the perspective of the people who are being studied' (Bryman, 1992, p. 61). For these and the reasons

stated in Chapter 1, the overall design for this study has its roots in the qualitative research methodologies usually associated with the social sciences.

Orlikowski and Robey (1991, p. 144) point out that whilst the research methods used in MIS have come in for much criticism over the past two decades, 'not all these criticisms, however, should be absorbed solely by researchers in the field of information systems'. The underlying disciplines of qualitative research methodologies too have been the subject of much heated debate and criticism (Bryman, 1988; 1992; Burgess, 1993; Burrell and Morgan, 1994; Van Maanen, 1983), particularly over the fundamental issues of ontology and epistemology (Burrell and Morgan, 1994; Bryman, 1992).

This chapter starts with an overview of the main issues of debate within the field of social science research and how they relate to researchers in the field of MIS. How they have been used to inform this piece of research, and the way in which these issues are addressed by this researcher are discussed. Detailed descriptions are then presented of the overall approach to the research design for this study, and the specific techniques and methodologies used to collect and analyse the data for this study.

4.2 Basic Issues of Qualitative Research

Burrell and Morgan (1994) suggest there are four philosophical issues which any social science researcher must address and be clear about where they stand, as shown in Table 4.1.

Table 4.1 The Subjective - Objective Dimension of Social Science Research (Burrell and Morgan, 1994)

The Subjectivists' Approach to Social Science		The Objectivists' Approach to Social Science
Nominalism	Ontology	Realism
Anti-positivism	Epistemology	Positivism
Voluntarism	Human nature	Determinism
Ideographic	Methodology	Nomothetic

Since Burrell and Morgan published the first edition of their book in 1979, this framework has been criticised (see Deetz (1996) for a recent review of such critiques). Nonetheless other researchers in the fields of both management and

MIS have found it useful, and, in accordance with the guideline stated in Section 1.5.2 for selecting frameworks to use, it is used by this researcher.

4.2.1 Ontology

Burrell and Morgan (1994, p. 1) posit that all social scientists approach their subject with a view, whether implicit or explicit, about 'the nature of the social world and the way in which it may be investigated'. First there are one's ontological assumptions about whether:

> 'the "reality" to be investigated is external to the individual - imposing itself on the individual consciousness from without - or the product of the individual consciousness; whether the reality is of an "objective" nature or the product of individual cognition; whether "reality" is a given "out there" in the world, or a product of one's mind" (Burrell and Morgan (1994, p. 1).

Thus the subjectivists' ontology is nominalism where the social world external to the individual's cognition is made up merely of names and concepts which are used to structure reality. Whereas the objectivists' ontology is realism, where the social world external to the individual's cognition is the real world which is made up of hard immutable structures. The individual is therefore born into and lives in a social world which has a reality of its own.

4.2.2 Epistemology

Associated with the ontological issues are one's epistemological assumptions, that which one takes as one's basic knowledge base, and hence how one begins to make sense of what one observes, which leads to the positivist, anti-positivist (interpretivist) debate. The positivist approach has its roots in the traditional pure sciences and Hirschheim (1985, p. 16) suggests is based on five key tenants, namely the:

- unity of scientific method;
- search for human causal relationships;
- belief in empiricism;
- value free nature of science;
- logical and mathematical foundations of science.

The positivists thus take the approach of developing a model and consequent series of hypotheses about the factors which affect the use/attitude towards IT. Their study proceeds then either to verify or falsify the hypothesis. The anti-positivist (interpretivist) approach on the other hand takes a less deterministic and empirical approach, and endeavours to construct meaning from what is observed. At the far extreme Burrell and Morgan (1994, p. 5) suggest 'the interpretists reject the standpoint of the "observer", which characterises positivist epistemology, as the vantage point for understanding human activities'. The individual must be viewed in the full context of their social surroundings. Lee (1991, p. 347) states:

> '...the physical artefacts, the same institution, or the same human action, can have different meanings for different human subjects, as well as for the observing social scientist. The observing social scientist must, among other things interpret this empirical reality in terms of what it means to the observed people. In accepting these inter-subjectively created meanings as an integral part of the subject matter that he or she is studying, the social scientist must collect facts and data describing not only the purely objective publicly observable aspects of human behaviour, but also the subjective meaning of behaviour for the human subjects themselves'.

Burrell and Morgan (1994, p. 5) state that whilst the interpretivist's epistemologies can take various forms they are firmly set against 'the utility of a search for laws or underlying regularities in the world of social affairs.' (At the far extreme) 'interpretists tend to reject the notion that science can generate objective knowledge of any sort'.

4.2.2.1 Epistemology and MIS

Some authors (eg., Kraemer and Dutton, 1991; Lyytinen, 1987; Marcus and Robey, 1988) have suggested that MIS research is fragmented, two main reasons being the lack of any unifying epistemology of its own research methods and a limited theoretical methodological foundation, and bound in with this a failure to accumulate consistent research findings (Markus and Robey, 1988). In the early days, not surprisingly, there was a tendency to draw heavily on the epistemologies of systems theory logic and computer science, and largely neglect any human and organisational aspects (Hirschheim, 1985; Lucas, 1975; Lyytinen, 1987; Marcus and Robey, 1988; Mason and Mitroff, 1973).

Much of the early research on organisational factors affecting the use and acceptance of MIS was undertaken from a positivist stance. As discussed in Chapter 2, there has been a gradual move towards adopting approaches

grounded in the social sciences such as social psychology, cognitive psychology, phenomenology, and sociology which can accommodate these human and organisational perspectives. However, despite adopting models of social behaviour which have their roots in social psychology, they still adopt an objective, positivist approach in terms of developing models which are then tested by survey techniques. Some notable exceptions which take an interpretivist approach being the studies of Calloway and Ariav (1991; 1995), Martin (1988), Newman and Noble (1990), Newman and Robey (1992), Orlikowski (1993), Sahay *et al.*, (1994), Toraskar (1991), Walsham and Han (1993) and Zuboff (1988).

4.2.3 Human Nature

Here the debate is about what model of man one takes. At one extreme there is the subjective view that sees man as rational, completely autonomous and free-willed, ie., free from Stewart's (1982; 1991) demands and constraints. At the other extreme the objectivists take a determinist view and see man and his activities as completely determined by the demands and constraints of his environment. Again, Burrell and Morgan (1994) suggest that every researcher has a view, whether implicit or explicit, on human nature which in turn will influence their research. This researcher is inclined towards the view that whilst senior executives do have considerable freedom and choice, the external pressures from shareholders have imposed some demands and constraints on how they work, if not directly then indirectly through peer pressure.

4.2.4 Methodology

The subjectivist's approach to methodology is the ideographic view which implies that one can only understand the social world by obtaining first-hand knowledge of the subject under investigation. Ideographic methodology traditionally includes ethnography, hermeneutics, phenomenology and case studies. The objectivist's research methods on the other hand are derived from the natural sciences and include the qualitative techniques of surveys, usually questionnaire based, laboratory studies and personality tests.

4.2.5 Pluralistic Approaches

Much of the debate over these issues has tended to be from an either or perspective, with each school of thought (objectivists and subjectivists) seeing

itself as being in competition rather than in support of each other. However, as Burrell and Morgan (1994), Bryman (1992), Giddens (1993) and Strauss and Corbin (1990) have shown, there are shades of grey along each of the dimensions listed in Table 4.1, and scope to take a pluralistic approach whilst still maintaining the integrity of a piece of research. Recently researchers in the field of MIS too have started to promote and adopt a more pluralistic approach (for example, Gable, 1994; Kaplan and Duchon, 1988; Lacity and Janson, 1994; Lee, 1991; 1994; Orlikowski and Baroudi, 1991; Orlikowski and Robey, 1991).

As Burrell and Morgan (1994), Bryman (1992) and Hirschheim *et al.*, (1991) imply, no researcher is truly value free, we all come with some preconceived set of beliefs and values, a paradox which Zuboff (1988) articulates so clearly.

> 'Behind every method lies a belief. Researchers have a theory of reality and of how reality might surrender itself to their knowledge-seeking efforts. These epistemological fundamentals are subject to debate but not to ultimate proof. Each epistemology implies a set of methods uniquely suited to it, and these methods will render the qualities of the data that reflect a researcher's assessment of what is vital. I believe that researchers ought to indicate something about their beliefs, so that readers can have access to the intellectual choices that are embedded in the research effort' (Zuboff, 1988, p. 423).

There is also always a trade-off between the ideal choice of method given one's beliefs and values, the subject matter being studied and hence what data it is realistic to be able to collect, and the purpose of the study (Benbasat, 1984; Bryman, 1992; Martin, 1988; Mintzberg, 1973; McKinnon and Bruns, 1992; Stewart, 1967). As outlined in Chapter 1, this researcher's beliefs have been informed by the ontology and epistemology of occupational and social psychology, and a subjective stance is therefore taken with the manager, rather than the computer, as the focus of attention.

4.2.6 Choice of Method for Data Collection for this Study

4.2.6.1 The Issues for this Study

As indicated in Section 4.2.4, from an extreme subjective viewpoint, the range of methods available for data collection really only includes ethnography, hermeneutics and phenomenology, using techniques such as case studies and interviews. Moreover, the chosen method should be as unstructured and open ended as possible. Stewart (1967), Sayles (1964) and Mintzberg (1973) identified

several suitable techniques for studying managers which included structured observations, activity sampling, diaries, interviews, and questionnaires, but these authors felt that structured observation, whilst expensive, is perhaps the only technique that provides a systematic approach to studying the issues of managerial work which were not understood. Questionnaires and structured interviews whilst more convenient to use may provided data which is not so reliable.

For this researcher the issues which therefore needed consideration were:

- balancing the subjective nature of the research topic with the need to provide some structure to the research design;
- how to take account of the relevant parts of the existing body of literature on end-user computing and EIS;
- finding a methodology and techniques therein which would be acceptable to senior executives;
- how to take account of the dynamic nature of the field of information technology;
- collecting data from a large enough sample to enable the results to be generalised and to assume away organisational and functional effects;
- collecting the data within a reasonable time-frame;
- gaining access to suitable senior executives;
- obtaining valid and reliable data;
- analysing the data obtained within a reasonable time-frame.

4.2.6.2 Sample Size

The subjectivist's ideographic approach assumes that people are unique, and as such there are two main options for the sample size (Weick, 1984):

- selective examination of many subjects;
- intense examination of a few subjects.

Within the many subject sample option there are two further choices:

a. many organisations, say up to twenty, but fewer interviewees within each, say five to seven;
b. fewer organisations, say seven to ten, but with a broader range of interviewees, say up to twenty.

To achieve a good spread of users across organisation and functions, organisations option (a) is preferred as it might allow more generalisation of the results (as Martin (1988) and McKinnon and Bruns (1992) found) and it might enable any organisational and functional effects to be assumed away.

4.2.6.3 Grounded Theory

Glasser and Strauss (1967) developed the approach of Grounded Theory, which was designed to help sociologists 'discover theory from data systematically obtained by social research' (p. 2). They developed this approach to counter the emphasis on deductive quantitative data collection and analysis approaches which they regarded as stifling any creativity on the part of the researcher. As Martin and Turner (1986, p. 141) put it so succinctly, grounded theory is designed 'to enable researchers to inductively develop a theoretical account of the general features of the topic while simultaneously grounding the account in empirical observations and data'. Turner (1981) suggests grounded theory is particularly useful for qualitative studies which involve gathering data from participant observation, face-to-face interactions, unstructured, and semi-structured interviews, and case studies.

Grounded theory has gained considerable acceptance as an approach within the social sciences (Martin and Turner, 1986; Turner, 1981), and has been used selectively within MIS (for example, Calloway and Ariav, 1991; 1995; Fisher, 1992; Orlikowski, 1993). In grounded theory

> 'data collection, analysis, and theory stand in reciprocal relation with each other. One does not begin with a theory, then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge' (Strauss and Corbin, 1990, p. 23).

Walsham (1995b) identifies three uses of theory within an interpretivist case study, as an initial guide to the design and data collection phase, as part of the iterative process of data collection and as part of the final product of the research as exemplified by Orlikowski (1993). Within a grounded theory the literature is used in conjunction with the data gathered during the study to 'sensitise' the researcher to what is important within the field of study. Glaser and Strauss (1967) and Strauss and Corbin (1990) therefore play down the first use and emphasise the last two uses. Walsham (1995b, p. 77) argues that IS research should draw more heavily on existing 'macro theories about the nature of organisations and the social processes within them'. Others, such as Kraemer and Dutton (1991) and Galliers (1993), have stressed the need to build on the existing body of

knowledge within MIS. Turner (1981, p. 228) suggests that Glaser and Strauss 'over-stress' the extent to which existing theory should be played down.

The overall approach of grounded theory was used to guide this study as it was felt that it would enable this researcher to take account of the existing body of knowledge on end-user computing and EIS whilst at the same time enabling her to explore the unknown. Slightly more emphasis was placed on the use of the available macro theories of MIS and the nature of managerial work than advocated by Glaser and Strauss (1967) and Strauss and Corbin (1990).

4.2.6.4 Process versus Variance Theories

Some authors suggest that one of the major issues within MIS research has been capturing changes in behaviour towards the computer over time (in particular Franz and Robey (1987), Hirschheim *et al.*, (1991), Newman and Sabherwal (1996), Orlikowski (1996) and Sabherwal and Robey (1993)). Whilst many models of organisational use of systems (eg., Nolan's (1973) stage model, Rogers and Shoemaker's (1971) diffusion of innovation) assume change takes place, the form and process is often not explicitly studied and reported on (Pettigrew, 1990). One reason for this is that use is often measured as a static single data point, and especially where the emphasis is on factor-driven quantitative approaches. Franz and Robey (1987) and Pettigrew (1990) suggested more attention should be placed on changes in use over time and that this could be achieved by taking a process rather than variable approach to use.

Mohr (1982, p. 9) divides explanatory theory into two types.

> 'Variance theory, roughly, the more common sort of hypothesis or model, such as a regression model, whose orientation is towards explaining the variance in some dependent variable. Process theory presents a series of occurrences in a sequence over time so as to explain how some phenomenon comes about.'

The difference between the two types of theories is summarised in Table 4.2. Mohr (1982) states that process models can complement variance models; whilst the variance approach seeks to identify what are the variables, the process approach focuses on the dynamics of the variation and seeks to explain the how and why of the relationship between the variables. He suggests the results from one type of model are not easily either interchanged or integrated with those from another type, and it would not be wise to try to do so. A paper by

Sabherwal and Robey (1995), however, published during the time that this study was undertaken has shown that variance and process strategies can be used jointly, and allow the researcher to gain additional insights.

Table 4.2 Characteristics of Variance and Process Theory, from Mohr (1982, p. 38)

Variance Theory	Process Theory
The basic explanation is causality.	The basic explanation is probabilistic rearrangement.
1. The precursor (X) is a necessary and sufficient condition for (Y).	1. The precursor (X) is a necessary condition for the outcome (Y).
2. A variance theory deals with variables.	2. A process theory deals with discrete states and events.
3. A variance theory deals with efficient causes.	3. A process theory deals with a final cause.
4. In variance theory, time ordering among the contributing (independent) variables is immaterial to the outcome.	4. In process theory, time ordering among the contributing events is generally critical for the outcomes.

Newman and Robey (1992) argue that another significant difference between the two types of models is the way they treat the antecedents. Variance models treat them as conditions with the potential to affect the outcome, whereas process models focus on the sequence of events within the conditions described by the antecedents. For example, having a computer on the desk may be a necessary condition for use, but it does not in itself guarantee that the executive will use the computer.

It might be argued that most MIS research (and in particular that on end-user computing and EIS) is variance based, as indicated in Chapter 2. Newman and Robey (1992) explicitly suggest that this is one reason why the results of many MIS studies are often contradictory. They used the process approach to explore information system development by viewing it as a social process between the user and the systems designer. They explored the events which affected their relationship, how the relationship changed and how these changes in the relationship influenced the way the system was developed. They classified events as either episodes or encounters. 'An episode refers to a set of events that stand apart from others, thus signifying the end of one sequence of activities and the beginning of another'. In their model, 'encounters mark the beginnings and ends of episodes' (Newman and Robey, 1992, p. 253). Encounters are therefore often shorter.

Newman and Robey (1992, p. 253) propose that 'such process models represent the more general punctuated equilibrium models'. There are many models of change (see Pettigrew (1988b) for a good exposition of these), and the punctuated equilibrium model is but one such model which several authors have shown can be very helpful for understanding the process of change (as demonstrated for example, by Gersick, 1991; Levinson, 1978; Newman and Robey, 1992; Tushman and Romanelli, 1985). Gersick (1991) in particular illustrated how change can be better understood if it is conceptualised in terms of the 'punctuated equilibrium' paradigm in which there are 'long periods when stable infrastructures permit only incremental adaptations, and brief periods of revolutionary upheaval' (p. 10). It is the latter which one would expect to lead to some form of change.

In Newman and Robey's (1992) case it was a change in the acceptance of the system. In this study it is changes in PC expertise. Mohr (1982) posits that change may not require special events, although Newman and Robey (1992) specified that 'an encounter between the analyst and the user was the most likely time during the development process when change might occur' (p. 253). They suggest that 'encounters are necessary, but not sufficient, events for changing the relationship between users and analysts' (p. 254). Very recently Orlikowski (1996) has suggested that change is endemic, and that change rather than stability is a more normal way of organisational life.

In this study the primary focus was to identify the events and encounters which led to changes in the executives' use of the PC and the nature of the changes (eg., in terms of frequency of use, tasks the computer was used for, type of applications used, and depth and complexity of use of the applications) rather than change as a process in itself.

Having adopted a general approach, there was still the question of which specific techniques and tools to use to collect and analyse the data, taking in to account the considerations outlined above. The options considered were case studies and interviews, each of which has its pros and cons, as discussed in the next sections.

4.2.6.5 Case Studies versus Interviews

A number of authors have cited the need to use case studies more extensively within MIS (for example, Benbasat *et al.*, 1987; Galliers 1991; Lee, 1989). One of the major strengths of the case study technique (Benbasat *et al.*, 1987; Bryman, 1992; Galliers, 1991; Lee, 1989; Leonard-Barton, 1990; Yin, 1989) is the richness of the data which can be collected using a variety of techniques such as direct

observation of the executives and interviews, and data which can be collected over time to show both the reality and the dynamics of the situation. The case study method is useful for exploratory work, especially where little is known about the situation being studied. On the other hand, the main disadvantage of this technique is that because of the intense nature of the data collection phase one is normally restricted to a very few organisations and hence a small sample size. Whilst much may be learnt about a specific set of executives in specific organisations, generalisation of the results can be limited (Bryman, 1992).

Access and continuity too can be a problem in general (Bryman, 1988; 1992) and especially to senior executives (as others have noted, such as Martin (1986), Mintzberg (1973), and McKinnon and Burns (1992)). Herriot (1992) and Handy (1989; 1994) amongst others have observed a trend towards people moving in and out of different organisations far more frequently than in the past. (Indeed, Kraemer *et al.*, (1993) found just such a problem, admittedly over a ten year period.)

The interview method has the advantage of enabling a larger sample from different organisations to be studied and hence more generalisation, whilst at the same time still allowing for exploration to take place. The issue of access is still a problem; the only advantage of the interview method is that one is asking for less time commitment, which, given the busy working schedules of senior executives, was felt to be an advantage. However, the interview method is fraught with problems (Bryman, 1988; 1992; Burgess, 1993; Cohen and Manion, 1980; Easterby-Smith *et al.*, 1991; Gordon, 1987; Kidder, 1981; Oppenheim, 1992), which include:

- validity and reliability of the interviewee's response;
- maintaining control of the interview whilst at the same time not constraining the interviewee from rambling, as the latter may be important;
- finding the right balance between being too structured (and hence almost positivist) and completely unstructured;
- creating a rapport with the interviewee in a short space of time;
- capturing sufficiently detailed data to allow one to see the true context of the interviewee's situation;
- bias on the part of the interviewer.

The focus of this study and the unit of analysis is the individual rather than the organisation, and although there may be a need to take account of the

organisational culture and context within which they are working, it is not the main focus. Therefore, despite these drawbacks, the face-to-face interview technique was felt to be more appropriate for this study.

4.2.6.6 Capturing Users' Depth, Breadth and Frequency of Use of the Computer

Using the 'Use over Time Graph' (shown in Appendix C), executives were asked during the interview to plot their use of the PC since they first started and describe how their use had changed over time with respect to frequency, the type of software used, and level of use (the depth and complexity of tasks undertaken).

Previous authors (for example, Mintzberg, 1973; Stewart, 1967; Straub *et al.*, 1995) have commented that executives can be poor at estimating the time they spend on an activity and the way they undertake that activity, one reason being that the people tend to satisfice and hence not take in to account all the data needed to make a good estimate. In the specific case of systems usage, researchers have often found a mismatch between self-reported frequency of the use and objective use as measured from computer records (see Straub *et al.*, 1995 for a review of this issue). It was felt that to try to obtain more accurate measures of use, for example, from either direct observation or computer generated logs of systems use would not be appropriate for this study and may be seen as both an intrusion of privacy and mistrust. Other researchers dealing with senior executives and their use of computers, adopted self-report measures for similar reasons (Boone, 1991; King *et al.*, 1992; Martin, 1988; McKinnon and Bruns, 1992). The diary method was considered as an additional technique.

Franz and Robey (1987, p. 207) found that some researchers also object to the use of process type techniques in a single data collection situation, feeling that such changes in behaviour can only really be captured during a longitudinal study. Martin's (1988) study revealed that managers' use of mainframe DSS changed over time and he was able to distinguish patterns of adoption, complete disuse and re-adoption. As far as this researcher could discern, there has been no similar study in relation to personal computer usage and applications other than DSS. Franz and Robey (1987) distinguish between the different purposes of a research study in terms of discovery and hypothesis testing, and suggest different time periods for the data collection. They suggest that single period observation can be acceptable for discovery of factors, but that ideally multiple periods of observation are needed to generate true process theories.

The purpose of this study was to illicit the encounters and episodes which caused any change and what form the change took with respect to their personal use of the computer and hence generate some model of the process that executives went through to develop their use of the PC. It was hoped that some of the content of the interviewees' description would be sufficiently 'thick' (Geertz, 1973) to enable this objective to be achieved, despite making single rather than multiple period data collection. (It is noted from papers published during this research, that the technique of asking interviewees to discuss historical events and provide a chronology of key events was suggested by Sabherwal and Robey (1995) and used by Newman and Sabherwal (1996).)

4.2.6.7 Myers-Briggs Type Inventory

The interview would be used to obtain data about the how and why, however, some means of understanding the personality of the executives was also required. There are a large number of psychological instruments which can be used to assess personality (Anastasia, 1976). The Myers-Briggs Type Inventory (MBTI) was chosen because it has been:

- shown to be valid and reliable for the sample under study (Gardner and Martinko, 1990; 1996);
- used by many other researchers in related contexts such as executive decision making (for example, Agor, 1985; Fisher, 1992; Nutt, 1993; Roach, 1986), management education (Carland *et al.*, 1994), end-user training (Davis and Davis, 1990), and the human-computer interaction, albeit primarily on students (see Pocius (1991) for an extensive review);
- shown to measure a number of personality attributes (Keirsey and Bates, 1984; Myers and McCaulley, 1985; Myers and Myers, 1982) which, as a result of the literature survey, it was felt might be of interest, eg., cognitive style.

There were also two pragmatic considerations. First, as a consequence of the above the MBTI is used in many organisations for management development, and it was therefore felt that the executives in this study would find it acceptable and be amenable to completing it. Over 75% of those interviewed completed the MBTI, which would seem to support this supposition. Second, completion of any such instrument takes time (typically 30 to 60 minutes, depending on the number of questions), and is subjective; respondents often give the answer for which they think you are looking. The MBTI was optional and interviewees were asked to complete it in their spare time. It takes about 30 to 40 minutes to

complete and the executives were forewarned. However, they were told that in return for their help they would receive, in confidence, a printed copy of their profile. By promising some feedback it was hoped that executives would complete it on the basis of how they really felt and not what they thought this researcher wanted. In that way they too would get some meaningful information from the feedback. There is no concrete evidence that this happened, other than to say that the profile often did reflect the executive as observed in the interview.

4.2.6.8 Summary of the Design for the Data Collection Phase

The overall aim of the research strategy for this study was to take a subjective approach which would enable this researcher to explore the chosen topic through the eyes of the executives being studied. Grounded theory and process theory were used to guide the overall design of the data collection phase. Some balance had to be struck on the methodological side between the ideal choice of technique for data collection and what could be realistically achieved: the risks associated with each choice were assessed and decisions were made knowingly.

A single point data collection strategy was adopted which incorporated a pluralistic approach of qualitative and quantitative techniques. The technique of the semi-structured interview was used as the primary method of data collection supplemented by the MBTI profile. (There are two versions of the MBTI, form G and F. Form G was used in this study because it is shorter and more practical for the purpose of this study. Form F is longer and more suitable for research in to the MBTI per se, rather than its application (Lindon, 1994).)

4.3 The Interview Guides

As a precursor to the main study a pilot study was undertaken to explore which of the issues cited in the end-user computing literature might be the most appropriate upon which to focus, and the different levels of computer expertise that would be reasonable to find amongst executives. Twenty three managers were interviewed whose use ranged from low to high and whose management responsibility for end-user computing (EUC) ranged from low to high, as summarised in Table 4.3.

These managers were drawn from 5 different Times Top 150 organisations, of which three subsequently participated in the main study and two said they wanted to but were unable to provide executives to be interviewed. Of the 23

managers, 4 were senior by the criteria stated in Chapter 1, and the remaining 19 were a mix of middle manager with responsibility for EUC within their business unit, MIS professionals and middle manager end-users. They represented six functions (finance (2), marketing (6), operations (5), personnel (3), research and development (2) and sales (5). The MIS professionals were located within either finance or operations.

Table 4.3 Pilot Study Population

	Responsibility for EUC		
Personal Use of the PC	Low	High	Total
High	11	4	15
Low	8	0	8
Total	19	4	23

Based on the literature of end-user computing, EIS, ESS and the nature of managerial work and the pilot study data, it was felt that the following six topics needed to be addressed during the interview.

1. Sociodemographic data, eg., gender, age, professional qualifications, career history, role in the organisation.
2. Experience with PCs, eg., tasks for which the computer is used, current level of use of the computer, eg., frequency of use, range of software and the level to which it is used.
3. How managers' competence with the computer was gained, eg., formal training, self-taught, etc., and how their competence has changed over time, eg., frequency and depth and breadth of software packages used.
4. Benefits (and drawbacks) of personal use of the computer.
5. Organisational norms, eg., other systems in use in the organisation, peer use of computers.
6. Future plans.

Two interview schedules and a 'Use Over Time' template were developed to help guide the data collection, one for the executives and one for use with the sponsors to collect background data. The 'Executive Interview Guide' and 'Use Over Time' template are shown in Appendix C. The former was developed using the literature, as described in Appendix B. The schedule was piloted on two colleagues, before the first batch of interviews were conducted. The interview guide used for collecting background information is shown in Appendix E.

For simplicity it was decided to keep to just one Executive Interview Schedule regardless of whether or not the executive was a user. In the case of the non-user, the questions relating to use of the computer were rephrased to probe how these executives tackled the tasks for which the users said they found the PC so helpful. Areas such as drawbacks and future plans were deemed to be just as relevant to the non-user. Firstly, a discussion on drawbacks might reveal why they do not use the PC. Secondly, based on the Theory of Reason Action (Ajzen and Fishbein, 1980), talk of future plans might indicate an intention to become a user.

As discussed in the proceeding sections of the data analysis methodology, the focus of the interviews was modified in the light of the initial fifteen to twenty interviews, but it was felt that for simplicity and continuity the same interview schedule would be used.

4.4 Sample Selection

Sample selection is difficult at the best of times and in reality in a study like this one is reliant upon a combination of luck and the good will of those one seeks to interview (Bryman, 1988; 1992; Burgess, 1993). The prime considerations were to interview executives who represented a cross-section in terms of:

- the use they made of the computer;
- organisational cultures (as defined by Handy (1981));
- industry sectors and functions therein.

The aim was for about twenty organisations with about five users within each organisation. Only large organisations (Times Top 150 or equivalent) were to be included, as it is envisaged that smaller companies might not have the range of end-users needed. Additionally, it was thought that other members of the chosen organisations would need to be interviewed to provide background information. For example, the personnel officer (for information on the training policy in general); and the MIS manager (to provide background information about the IT policy). There was no specific limit on the organisation's geographic location other than that, from a cost perspective, the interview should take place in England .

In the first instance, using the 1994 Financial Times annual 'FT 500' survey of the European top 500 companies, a potential list of suitable organisations was

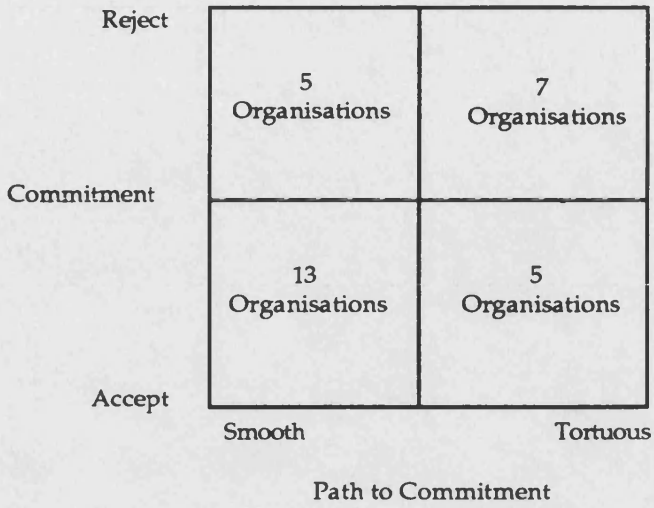
identified where the researcher had either direct or indirect personal contacts (the indirect contacts being in the form of direct contacts of her colleagues). Additionally, two large government agencies were selected. Within each organisation a 'sponsor' was sought, either in the form of the initial contact or through that contact. The sponsor's role was seen as, first and foremost, to seek approval for the organisation's participation. Second, to help select potential executives to interview (basis of the level of seniority using the criteria described in Section 1.4.1 and the level of use they made of the computer). Third, to act as a general reference point when extra information was needed, either providing the information directly or directing the researcher where to find the information (eg., about the MIS policy, organisational politics or confirmation of an aspect of what an executive said that perhaps did not quite fit with the general tone of the interview).

As a result of this researcher's work, she was fortunate enough to have an extensive network of contacts, and so in only one instance was a cold call made. This was to an organisation whose MIS director had featured prominently in the press, and the organisation was in a sector where at the time there was no firm commitment to participate. In one other case the contact in one organisation referred the researcher to another organisation where he knew the managing director was a very keen user.

Approaches were made to 30 organisations (including those who had participated in the pilot study), of which 18 eventually agreed to participate. The path from the initial approach to the final interview varied, and the matrix shown in Figure 4.1 describes the overall situation. A 'smooth' path was where there was a quick acceptance or rejection, and in the case of the acceptance the executives were quickly identified, often during the initial discussion about the project, and approached almost as soon as they had been identified.

A tortuous path was one where it took several discussions before a decision was made to participate or not, and where there was a commitment seeking out the right executives often proved hard. In these cases more often than not the sponsor felt he had to find the 'right moment' to approach the executive, and this often took time. In three cases this was because the organisations were in the middle of either take-over bid situations or significant internal reorganisation. In three cases the organisations made a decision to commit, but were never able to provide a list of suitable executives.

Figure 4.1 The Path from Approach to Commitment



The criteria for selecting executives within participating organisations were seniority (using the guidelines established in Section 1.4.1) and the extent to which they used the computer. Based on the work of Rainer and Harrison (1993), and the pilot study, five broad categories of user were identified, from non-user to expert user, as described in Appendix D. These broad definitions were used to help sponsors identify suitable executives. Prior to the interview executives were therefore broadly categorised as non-users, novice-users, end-users or expert-users. After the interview each executive was assigned to a definite category on the basis of the written interview notes. In a few cases the executive was re-categorised on the basis of either the detailed transcript of the interview or the subsequent 'executive end-user' cube developed and discussed in Section 6.5.5.

During the period that the interviews were conducted, checks were made to ensure that a spread of expertise was represented, and hence no one category was over-represented. Where it was felt that there might be some imbalance (eg., too few non-users) this initial process of categorisation allowed the researcher to redress the balance by asking sponsors if they could find executives in the appropriate categories.

Despite these not unusual problems of gaining access to senior management, 103 executives were interviewed from 18 different organisations over a ten month period (from mid-September 1994 to the beginning of July 1995).

4.5 The Interview Process

Once the executives had been identified, their willingness to be interviewed was sought either by the sponsor or this researcher. There were no hard and fast rules, although wherever possible the researcher tried to encourage the sponsor to make the initial contact. After agreement to the interview was given an appointment was arranged, usually through the executive's secretary, but sometimes directly with the executive. Again, the sponsor (or their secretary) often played a key role in this part of the process in terms of trying to schedule the interviews in batches to minimise travel. However, given the busy nature of these executives this was not always possible.

It was envisaged that each interview would take about one and a half to two hours, and two hour slots were aimed for in each executive's diary. Not surprisingly, this was not always possible, and on average a one and a half hour slot was made available. Interview appointments were reconfirmed the day preceding the interview.

Before each interview, background information was obtained from the sponsor about the executive (perceived attitude towards, and use of the PC, their standing in the organisation, hobbies, special areas of interest, and indeed any general guidance which would enable the researcher to optimise the time with the executive). Although the interview was designed to be as open as possible to illicit the executive's viewpoint, there is a fine dividing line between being too directive, to the point that the interviewer interrupts the interviewee and obtains only superficial data, and being completely non-directive. Easterby-Smith *et al.*, (1991) specifically caution against the latter, warning that it can lead to the interviewee having no clear picture of what the interviewer is interested in, and, conversely, the interviewer gains no clear picture of what issues the interviewee is addressing. So advice was sought wherever possible about whether or not an executive would need to be guided.

At the start of the interview the researcher established the purpose of the interview and the confidentiality of the interview. Executives were asked if the interview could be recorded on audio tape, to which all agreed. Hand-written notes were also taken during the interview. At the end of the interview the executive was asked if they would complete the MBTI at some point over the next few weeks. Thank-you letters were sent to each executive after the interview. In a few cases specific points were followed up by phone.

As Stewart (1976) and Martin (1986) note, executives can be inclined on the one hand to play down issues and topics which show them in a bad light, but on the other hand overestimate their ability and expertise. Like Martin (1986), this researcher took a sceptical view of the users' expertise and wherever possible, and without appearing distrustful, tried to probe for hard evidence - for example, by asking them to talk in more detail about how they approached a certain task.

All the interviews were conducted within the executive's own organisation, and more often than not within their office. In an attempt to gain as much information as possible about the executive as an individual, notes were made after each interview about the total interview process, ie., from the moment the researcher arrived at the organisation to the time of departure. For example, who collected the researcher from reception, how punctual was the executive, were interruptions allowed and, if so, how did the executive handle them.

What was the decor of the office, eg., type of furniture, volume of paper on the executive's desk, or lack of it? Where was the computer situated? What 'social artefacts' were there in the office, such as pictures, photos, and trophies? Where did the executive sit in relation to the researcher, eg., behind his desk, at right angles, across a coffee table? The executive's appearance was also scanned.

4.6 Other Sources of Data

Whilst the executives' interviews and their MBTIs were the primary source of data collection, several other secondary sources were used which included:

- company reports and newsletters;
- internal strategy papers, for example of the organisation's MIS policy;
- organisation charts;
- informal conversations with the executive's secretary;
- informal discussions with the executives themselves;
- the sponsor;
- the MIS director for MIS policy;
- external newspaper and journal articles about either the organisation or the executives.

Where multiple interviews were conducted on one day, one of the executives often took the researcher to lunch, which provided another opportunity to gather information. Secretaries too often provided useful and insightful bits of

information when they accompanied the researcher to and from the executive's location. As indicated, nuances were often checked with the sponsor, for example where the executive made comments which led the researcher to feel there were hidden agendas, or there was some discontinuity with respect to what was said during the interview. For example, an executive would insist he was very positive about the use of computers but would not use one himself.

4.7 Data Analysis Strategy

4.7.1 Introduction

Any study like this generates large volumes of unstructured data from which the researcher hopes to make some sense in order to illicit the main themes and possibly generate some theories. In this case, given the average interview for each of the 103 executives was 1.5 hours, there were approximately 154.5 hours of taped interviews to analyse. There were three interrelated data analysis issues which this researcher felt needed addressing for this study.

1. What techniques should be used to analyse the data?
2. How much of the interviews needed to be transcribed?
3. When should the interviews be transcribed?

There are a range of techniques available for the analysis of qualitative data, from basic content analysis where the main purpose is to count the number of times a phrase or word is used, to more complex techniques such as protocol analysis (Bryman, 1988; 1992; Bryman and Burgess, 1994; Burgess, 1993; Easterby-Smith *et al.*, 1991; Miles and Huberman, 1994). Not surprisingly the positivist - interpretivist debate persists over the different techniques. For example, Lacity and Janson (1994) recently suggested that many researchers see all qualitative methods as interpretivist (anti-positivist) and all quantitative research as taking a positivist approach, which they feel is not the case. They developed a framework for qualitative text analysis which shows how both positivist and non-positivist philosophies can be taken into account, depending on how the text is analysed. Content and script analysis are classified in their terms as quantitative positivist approaches, whereas hermeneutics is seen as a qualitative interpretivist approach. Yet it is surprising that there is no mention of the techniques of grounded theory which has its roots in phenomenology, and which Walsham (1995a, p. 379) cites as an interpretivist approach, an assertion with which this author concurs, as will be illustrated later.

To meet the goals of this research, as outlined in Section 4.1, there were broadly three levels around which it was perceived the data from this study needed to be analysed.

1. Quantitative analysis of what the executives actually do, eg., the types of tasks for which they use the PC, and the benefits they perceive they obtain.

2. Qualitative analysis of the process executives went through to develop their expertise with the PC over time.

3. Qualitative analysis of why they do what the do, and why they perceive what they do is beneficial.

The volume of the data which are produced by a study like this presents researchers with two major conflicting and equivocal issues. On the one hand, the richness of the data enables one to generate a 'grounded understanding' (Orlikowski and Baroudi, 1991) of some of the processes and issues associated with executives' use of the PC. Conversely, as they point out, there is always the concern that the theories so developed are empirically valid and free from the researcher's own preconceptions. Eisenhardt (1989) argues that the iterative nature of grounded theory in fact leads to quite the opposite outcomes, that is, theory which is free from subjectivity and empirically valid.

The other main issue is that of reducing the volume of data whilst maintaining its integrity and validity (Huberman and Miles, 1983; Miles and Huberman, 1994; Van Maanen, 1983). Two techniques which offer solutions to this problem are the techniques of coding, as described by Glaser and Strauss (1967), Miles and Huberman (1994), Strauss and Corbin (1990) and Turner (1981) and cognitive mapping by Eden *et al.*, (1979; 1983) and Huff (1990). These have been used by previous researchers in this field (for example, Calloway and Ariav, 1991; 1995; Leonard-Barton, 1990; Martin and Turner, 1986; Newman, 1989; Orlikowski, 1993; Sayay *et al.*, 1994; Toraskar, 1991). Coding as a technique for data reduction and exploring the real meaning behind what is being said is neither new nor unique to grounded theory (see Miles and Huberman (1994) for an extensive review of the different ways of coding). As Newman (1989, p. 54) points out, the 'exegetical method is a long-established approach to the analysis of textual fragments', and has been used as a powerful tool to analyse biblical and other ancient texts to bring out the full meanings of the text. It is the way of coding and in particular the 'constant comparative' methodology and iterative and inductive procedures of

grounded theory which make the grounded theory approach appropriate to this study (Glaser and Strauss, 1967; Strauss and Corbin, 1990; Turner, 1981).

Protocol analysis was considered, but rejected for the reason highlighted by Benbasat (1984), namely, it is more suited to the study of less structured tasks and the process of decision making. It can be very resource intense (needing at least one other person to check the analysis) and, as Ericsson and Simon (1993) point out, despite such cross-checking, it can be just as subject to objectivity and reliability issues as less resource intense techniques, such as cognitive mapping.

With respect to when to analyse the interview, Yin (1989) suggests all data be transcribed and that the researcher's notes and impressions be attached separately within 24 hours. Glaser and Strauss (1967) suggest that data collection and analysis should proceed in parallel.

As with the data collection, a pluralistic approach will be used to analyse the data which incorporates both the qualitative techniques of grounded theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990) and cognitive mapping (Eden *et al.*, 1979; 1983; Huff, 1990) and some more quantitative techniques such as basic content analysis (Miles and Huberman, 1994; Weber, 1990).

4.7.2 The Grounded Theory Technique of Data Analysis

Grounded theory allows one to develop theory from field data rather than adopting the empirical approach of developing theory and using field data to test the theory (Glaser and Strauss, 1967). Theory in the context of grounded theory is defined as a set of conceptual categories and their properties which are related and integrated such that they describe the phenomena under observation. A grounded theory has four interrelated properties (Glaser and Strauss, 1967, p. 237). First it should 'fit' the field in which it is being used. Second, it should be 'understandable' by the layman. Third, it should be sufficiently 'general' to be applicable to a multitude of diverse daily situations within the substantive area, not just a specific situation. Fourth, it must allow the user 'control' over the structure and process of daily situations as they change through time.

Glaser and Strauss (1967) identify two types of theory, substantive and formal. Substantive is defined as a theory which covers a substantive, or empirical, area of enquiry and is more often than not developed from the literature, for example research organisations, patient care, or race relations. Formal theory is defined as

that which pertains to a formal, or conceptual area of the study and is that which is most often developed from field studies, for example deviant behaviour, social mobility, or reward systems. The emphasis in grounded theory is on 'theory as process'; that is, theory as an ever-developing entity, not as a perfect product (Glaser and Strauss, 1967, p. 32).

In grounded theory data are analysed in three different but intimately linked ways - 'open', 'axial' and 'selective' coding - to produce the key categories (Glaser and Strauss, 1967; Strauss and Corbin, 1990). First, data are coded using open coding (Glaser and Strauss, 1967; Strauss and Corbin, 1990). The data are examined and compared across different situations to produce broad conceptual categories which have properties. These properties are best described as attributes and characteristics which are associated with each category. For example, a category might be 'spreadsheets', and associated properties might be the frequency of use, the depth of use and the size of application developed, etc. Properties can therefore have dimensions such that each time a category occurs in the data it can be located somewhere on the dimensional continua. Each category will thus have a separate dimensional profile. These profiles can then be grouped to look for patterns (Strauss and Corbin, 1990, p. 70). Properties in turn can be sub-categorised if needed. Any part of the data can be open coded, from a single sentence to a whole interview.

Central to the open coding process is the process of making constant comparisons between similar incidents (where the phenomena are observed and where they are not observed) and across other categories to look for new categories, properties and differences. Thus the way in which comparisons are made is different from the normal use of comparative analysis. One is not looking either to prove or disprove a fact, or show how one situation is different from another, as is so often the case in an empirically based study. Rather one is looking to see why, how, and in what circumstances an incident occurs and hence what more can be learnt about that category. That is, what other properties might it have and to what other categories might it be linked. It is from the process constants comparison that theories can be generated (Glaser and Strauss, 1967).

If open coding fractures the data, axial coding is designed to allow one to put the data back together in such a way as to make connections between a category and its sub-categories and categories as a whole (Strauss and Corbin, 1990).

Finally there is selective coding, which is the process of 'selecting the core categories, systematically relating them to other categories, validating those relationships, and filling in categories that need further refinement and development' (Strauss and Corbin, 1990, p. 116).

In reality, Strauss and Corbin (1990) suggest, these levels of coding take place simultaneously, and one moves back and forth between the levels during the coding phase. From the categories one develops concepts and in turn theories, and one should also move back and forth between coding and the theory development process. Failure to do so 'may lead to concepts and ideas being missed or disregarded' (Glaser and Strauss, 1967, p. 43).

There are three other tenants of grounded theory which are relevant to this study at this stage: 'theoretical sensitivity', 'theoretical sampling' and 'theoretical saturation' (Glaser and Strauss, 1967). Theoretical sensitivity is the researcher's ability to look beneath the surface level data for subtleties and see what other data may be relevant to the study. Theoretical sensitivity is developed from two sources, first by having an intimate knowledge of the literature and personal and professional experience with the field of study. Second, it comes from continual interaction with the data and being able to analyse the sub-text of the interview data. Strauss and Corbin (1990) and Glaser and Strauss (1967) suggest that theoretical sensitivity helps one formulate theory that is faithful to the reality of the phenomena being studied.

Theoretical sampling, on the other hand, is to do with the sample size. Allied to the issue of data reduction is determining how many to include in the sample, and how much of the data gathered needs to be analysed in great detail. Glaser and Strauss (1967) posit that 'theoretical saturation' occurs when no new data emerge from the group under investigation. There are two aspects of theoretical saturation. First, the point at which no new categories emerge from the data, and second, the point at which no new properties emerge from the categories and hence a category is said to become saturated. The general rule for grounded theory is to sample until theoretical saturation of each category is reached (Strauss and Corbin, 1990, p. 188).

Leonard-Barton (1990) in a three-year study of nine sites, found that the main themes emerged from the first 25 interviews, and that the remaining 120 interviews she conducted, primarily added 'bulk' and density. Toraskar (1991)

found a similar pattern whilst the initial categories became saturated, fewer and fewer new categories emerged as they progressed through their interviews.

Allied with the concept of saturation is the need to validate the concepts and associated theories which have been generated in the first instance, and whilst no new data may be emerging the remaining data should still be analysed to test and validate the concepts and theories.

Glaser and Strauss (1967, p. 112) suggest:

> 'if new categories do emerge in a large study one should not necessarily go back and re-code, but rather code for the new category at the point it emerges and continue until the end of that batch of data to see if it becomes theoretically saturated. If it has, then it is unnecessary to go back either to the field or the notes, because theoretical saturation suggests that what has been missed will probably have little modifying effect on the theory.'

The grounded theory approach will be used to interpret and analyse the data from this study for the same reasons as Orlikowski (1993) chose it for her research on the adoption of CASE tools in organisations. First, 'grounded theory is an inductive theory discovery methodology that allows the researcher to develop a theoretical account of the general features of the topic whilst simultaneously grounding the account in empirical observations or data' (Martin and Turner, 1986, p. 141). Second, a major premise of grounded theory is that to produce accurate and useful results, the complexities of the organisational context have to be incorporated into an understanding of the phenomenon, rather than ignored (Martin and Turner, 1986; Newman and Robey, 1992; Yin, 1989). In this case it is the context within which the senior executive operates (as exemplified by, Kotter (1982), Isenberg (1984), Mintzberg (1973), Stewart (1967; 1982; 1991) and Weick (1983)), rather than the organisational culture as a whole. Third, grounded theory 'facilitates the generation of theories of process, sequence, and change pertaining to organisations, positions and social interactions' (Glaser and Strauss, 1967, p. 114).

Orlikowski (1993, p. 330) notes that by attempting to connect the grounded theory with the aspects of existing formal theory, a more general substantive theory can result, as suggested by Glaser and Strauss (1967). Eisenhardt (1989, p. 545) too advocates this approach and suggests that it 'enhances the internal validity, generalizability, and theoretical level of theory building'. It is hoped that this will be true too for this study.

Thus the interviews will be analysed from the positivist perspective with a view to drawing quantitative conclusions about the tasks for which the executives use the computer, and other associated hard data such as frequency and place of use. For this, straightforward basic content analysis of the text as it stands will be used (Miles and Huberman, 1994; Weber, 1990). The categories will be those deduced directly from what the interviewee says, for example tasks for which they use the computer and specific types of software. This is what Miles and Huberman (1994, p. 54) call 'descriptive' content analysis and rarely needs much interpretation, as opposed to the inductive type of coding of the grounded theory approach which will be used to analyse the how and why (levels 2 & 3 of the text). The grounded theory approach will thus enable an interpretative approach to be taken when it comes to analysing the rationale behind what they do.

Whilst the overall philosophy and strategy for analysis will be that of grounded theory, there are within that approach the tactical issues of data management and display. As practised by Orlikowski (1993), in this study too, other specific qualitative techniques will be used to handle the data, such as cognitive mapping and process analysis.

4.7.3 Process Analysis

Process is an important aspect of grounded theory (Strauss and Corbin, 1990). It is seen as the linking of sequences of action and interaction as they pertain to the management of, control over, or response to a, phenomenon. The linking of sequences is accomplished by noting changes in conditions which influence the action over time (in this case uses of the PC), what influences these changes, and the consequence of these changes. Newman and Robey (1992), based on the previous work of Robey and Farrow (1982) and Robey *et al.*, (1989), developed a process model for studying the interaction between users and systems developers. They mapped events over time to show the changing relationships and outcomes. Events were categorised as either 'episodes' or 'encounters' (as discussed in Section 4.6.2.4). Whilst the techniques of grounded theory will be used to analyse and conceptualise the events and episodes from this study, these will then be mapped using the technique of Newman and Robey (1992) to explore the processes the executives have gone through to develop their expertise with the computer and how their use has changed over time.

4.7.4 Cognitive Mapping

Grounded theory allows one to induce the conceptual categories and their properties and hence the links between properties and categories. Much of the data analysis in this study will be at the individual level, exploring how executives' minds work, which, as Miles and Huberman (1994) note, can result in quite complex patterns. As indicated, the techniques of cognitive mapping as exemplified by Eden *et al.*, (1979; 1983) and Huff (1990) were felt to provide a more convenient technique than protocol analysis for handling and managing the data relating to these patterns, especially when it comes to the analysis of the benefits the executives obtain from their use of the computer. The cognitive mapping software package 'Graphics COPE'[1] (COPE) will be used to support the generation of these cognitive maps.

With an open interview based research study like this, two major issues are how much and how many of each interview needs to be transcribed verbatim. Strauss and Corbin (1990) advocate more rather than less. If the text were being analysed from a totally interpretivist approach, using for example protocol analysis (Ericsson and Simon, 1993; Miles and Huberman, 1994), one might be inclined to advocate a complete verbatim transcript of each interview. However, as indicated, there is strong evidence to suggest that a detailed analysis of a selected sub-sample of the total sample will reveal the bulk of the concepts (Leonard-Barton, 1990; Strauss and Corbin, 1990; Toraskar, 1991). Newman (1989) interviewed 13 subjects and, whilst full transcripts were made of each interview, he chose a 28 sentence extract to analyse in detail to illustrate his main thesis.

4.7.5 How Many of the Interviews to Transcribe and When?

Many authors on qualitative research methods suggest that all data be transcribed and that the researcher's notes and impressions be attached separately as quickly as possible (for example, Bryman, 1988; 1992; Bryman and Burgess, 1994; Burgess, 1993; Easterby-Smith *et al.*, 1991; Miles and Huberman, 1994; Yin, 1989). Yin (1989) specifically specifies 24 hours as the ideal time between interview and transcription. Glaser and Strauss (1967) suggest that the data collection and analysis should proceed in parallel. In order to accommodate the parallel process of data collection and analysis a schedule was drawn up to

[1] Graphics COPE is the name of the proprietary mapping software produced by the University of Strathclyde.

indicate roughly within each quarter when an organisation's participation would be needed. When the request was made for an organisation's participation an indication was given of when they would be needed. In some cases this was not a problem. However, as described in Section 4.4, in some organisations it took far longer than anticipated to gain access to the executives. Also in two cases the participating organisations were involved in mergers and takeovers and the interviews had to be conducted within a very narrow window of time to fit with the organisation's and executive's business plans. After about the first three months of interviewing, to a great extent, it was hard to control the interviewing such that data collection and analysis could proceed simultaneously throughout the research programme.

To counteract the potential loss of the more esoteric impressions and data which emerge from interviews such as this, a process was implemented, as described in Section 4.5, whereby notes were made immediately after the interview (sometimes hand-written, sometimes verbally straight on to the interview tape) about the contextual and social matters relating to the interview The written interview notes themselves were briefly reviewed within 24 hours to identify either any obvious omissions or points which needed clarifying. These were followed either in the letter of thanks which was sent out, or by a phone call.

4.8 Text Analysis - Computer versus Manual Methods

There are several specialist computer based text analysis packages (Miles and Huberman, 1994; Richards and Richards, 1994; Weitzman and Miles, 1994). Some of these were examined, and in particular NUDIST[2] . The choice was made to keep to manual methods except for the use of the COPE cognitive mapping software for two main reasons, First, with the exception of COPE, the packages which were examined appeared complicated. Consequently, this researcher felt that by the time she had mastered using the package it would be almost as quick, if not quicker, to use conventional manual methods of a highlighter and lots of sheets of A4 paper. Second, the cost of accessing the software was high. None of the text analysis packages were readily available and so either the software would have to be purchased or accessed though some other source. In contrast, COPE was perceived to be easy to use and of benefit. As such it was easy to

[2] NUDIST is the name of Qualitative Solutions and Research Pty Ltd's proprietary data analysis software.

justify the purchase of a copy for this project, and these initial perceptions were found to be justified.

4.9 Qualitative Statistical Techniques

As the emphasis of this study was on exploring issues rather than testing hypothesis, it was not envisaged that much of the data would lend itself to statistical analytical methods, except perhaps the MBTI data. Some of the hypothesis proposed in Section 3.17.3 on the relationship between the use of the computer and the executive's MBTI profile will be checked using the chi squared for statistical significance.

4.10 The Data Analysis Process

The overall data analysis procedure is summarised in Figure 4.2. The first 15 interviews were transcribed in detail soon after they were conducted and certainly within 4 weeks of the interview taking place. This batch was then skimmed and reviewed 'with a fairly open mind' (Martin and Turner, 1986) to see what issues were either emerging or not in relation to those already identified from the literature. From this some modifications were made to the focus of the interviews which can be summarised in Table 4.4.

Emerging themes and issues were extracted and recorded on a separate document. From this a clearer picture started to emerge of what parts of the interviews to extract in detail, ie., as verbatim transcripts rather than summaries.

Table 4.4 Changes in Emphasis in the Interviews

More Emphasis	Less To No Emphasis
The ways use of the PC had changed over time	Satisfaction with systems
The executive as a person and how he operates and what he perceives his role to be	Procedures for acquiring hardware and software and having systems developed

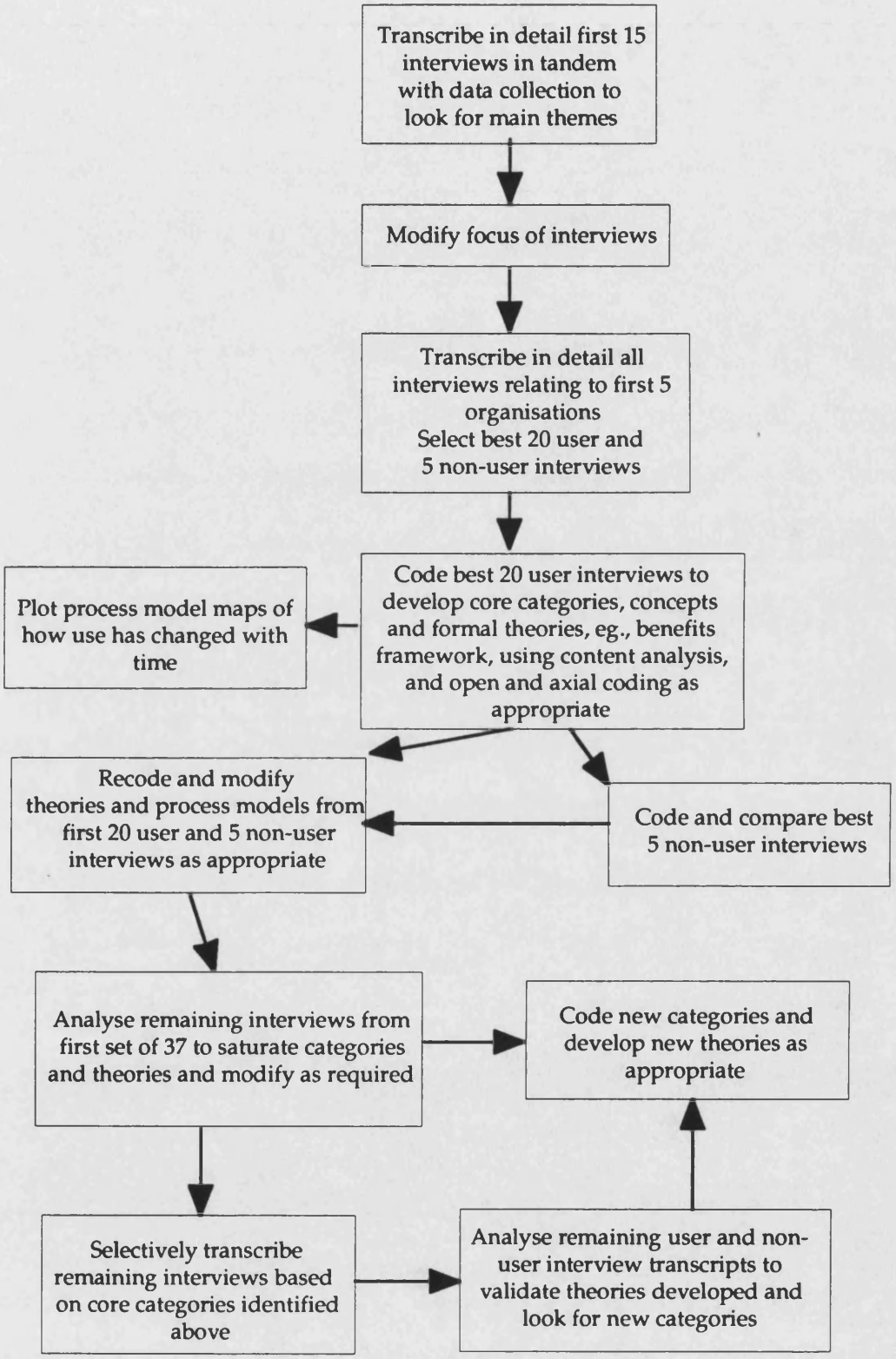
Over the nine month period during which the interviews took place it was possible to transcribe in detail 37 of the interviews. These covered the first five organisations to participate in the study. As indicated, in the section on research design, both users and non-users were interviewed with a view to looking for differences and hence factors which differentiate the user from the non-user. Within the first 37 interviews, 28 were users and 9 were non-users. Congruent

with the practices promoted and used by others (such as Leonard-Barton, 1990; Martin and Turner, 1986; Strauss and Corbin, 1990; Toraskar, 1991) the 'best' 20 user-interviews were then analysed in detail using the grounded theory approach to coding outlined previously. Using the coding scheme and categories developed from the user-interviews the 'best' 5 non-user interviews were then analysed using comparative techniques to identify similarities and anomalies. Some of the interviews analysed at this stage included those initially transcribed to identify the main themes and modify the interviews. Those not included in this stage were incorporated into the main final data analysis phase.

Not unnaturally, given the nature of senior executives' lives (Mintzberg, 1973), not all the interviews went according to plan. In some cases interviews were rushed, perhaps as a result of either a previous appointment over running, or an unforeseen crisis which needed to be dealt with. In some instances the researcher felt the interview was superficial in that there was a feeling (and it was no more than feeling) that the interviewee never truly opened up. In some cases it was hard for the interviewer to keep the interviewee on a useful subject. 'Best' is therefore used here to describe the interviews where the researcher felt the interviewee was most open and honest, the interview had gone well in that it was neither rushed nor curtailed, and the data felt in some way richer and deeper than others, and last but most importantly the executive was indeed senior using the criteria established in Section 1.4.1. In some instances, despite careful selection, the executive was not deemed to be senior by this definition.

The selected set of 20 'best' users interviews were initially analysed as follows. Content analysis and open-coding were done on the text as it stands, to provide level 1 and 2 type analysis and hence generate the core categories, that is, what are the executives doing, what are benefits they perceive they obtain from what they do, and how have they developed their competence to do what they do? The sub-text, ie., verbatim transcripts relating to the core categories, was then analysed for the properties of these core categories. Using axial coding the text and the sub-text were analysed to look for links between the categories and to try to develop some concepts and hence frameworks and user models (formal theories, Glaser and Strauss, 1967) which could be used to make sense of the how and why aspects (level 3). These 20 interviews were then re-examined and re-coded in the light of the emerging new categories and frameworks to see which best fitted the bulk of the data, as exemplified by Orlikowski (1993). Links were also made with the data from the MBTI profile data. (The COPE software was found to be very useful for axial coding.)

Figure 4.2 Overview of the Procedures for Analysing the Interview Data



The non-user interview data were then compared and contrasted to look for anomalies using the 'constant comparative analysis' techniques of grounded theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990). Orlikowski (1993) found that it soon became clear that the data from the site which had not successfully implemented CASE did not fit the analysis generated from that where it had been implemented successfully, and that some redefining of concepts was required. A similar situation was found in that different concepts started to emerge from the non-user interviews.

The remainder of the initial batch of 37 interviews was sifted, (to weed out any interviewees who were not truly senior) and then analysed to continue to validate the categories and 'bulk' to the existing concepts, theories and frameworks, and look for new categories. As anticipated, the core categories soon became saturated. The remaining 66 interviews were sifted and then transcribed but in less detail. Only those portions were transcribed which were relevant to either the concepts and theories already developed or new categories. The data from the remaining interviews were used to add bulk and density to the categories and their properties and hence further validate the theories, and make modifications as appropriate.

During the transcription it quickly became apparent that much of what each executive said about how and why they used the PC was often linked to some statement about how they personally operated as an executive in terms of Mintzberg's (1973) managerial roles and job, and Kotter's (1982) concepts of managerial activities. The COPE cognitive mapping software was used to support the data analysis by producing maps of the first batch of good interviews to look for links especially between how the executive talked about his role and why and how he used the PC to support him.

4.11 Summary

The experimental design for this research was influenced by this researcher's subjective belief and ontology and epistemology, drawn from previous training in occupational psychology. However, like others before her, she had to strike a balance between a desire to stick entirely to subjectivist and hence interpretivist methodologies, and the realities of the phenomena being studied. Using the grounded theory approach, pluralistic research strategy was developed which enabled a mix of qualitative and quantitative data to be collected and analysed, whilst at the same time preserving the integrity of the goals of the study.

CHAPTER 5 - Data Analysis

This chapter is an introduction to the results and analysis. It contains a description of the sociodemographic data of the sample of the executives interviewed and used in the analysis, and a brief description of their organisations. The format for the presentation of the analysis and results is also outlined in this chapter.

5.1 Composition of the Final Sample

One hundred and three executives were interviewed from 18 organisations, as shown in Table 5.1. Each interview lasted on average 1.5 hours, which represents a total of 154.5 hours of formally taped executives' interviews. In addition there were all the data collected through the informal sources described in Section 4.6. Two of the organisations, I and S, were not comparable to the rest. I was a non-profit-making organisation and S was a mutual society, and both were smaller than the other organisations in terms of either the number of employees or the turnover. They were more like medium size Times 250 to 500 type organisations and it was decided to exclude these from the final data analysis. (For example, the profit for organisation R, which is near the bottom end of the Times Top 150 Organisations was £101m for the year 1994/5 compared to £53m for organisation S. Organisation I employs less than 500 people compared to R which has between 33,000 to 37,000 employees.)

Of the executives interviewed in the remaining organisations, seven were not senior in terms of the criteria stated in Section 1.4.1 and were omitted from the final analysis. The results of the data analysis are therefore based on a final sample size of 85 senior executives (about 127.5 hours of taped interviews) drawn from 16 organisations, as shown in Table 5.1.

A key factor in gaining access to the executives was the promise of preserving their anonymity and confidentially. Therefore each executive has been given an alphanumeric code; the first letter indicates their organisation, eg., A3 = executive number 3 from organisation A. Where quotations from an interview are included, the code number of the executive it is attributable to is given. Where any names are given, for example individuals, locations and in-house systems, these have all been changed to preserve the anonymity of the executives and their organisations. Table 5.2 gives a summary of the sociodemographic

background data for each of the 85 executives interviewed and included in the final sample for analysis.

5.2 Gender, Age, Education, MBTI Profile and Functional Position

Tables 5.3 to 5.7 and Figures 5.1 to 5.4 show the composition of the sample by age, gender, education, MBTI profile, and functional position. Nine percent were female (Table 5.3), which is comparable to the number of women in senior positions according to a recent survey conducted by the Institute of Management (1995). In a survey of 19,444 individuals from 328 organisations, they found 10.7% of the 'managers' were women of whom 3% had reached the boardroom. Alexander (1995) found that of the top 200 companies in the UK (including companies whose head office was outside the UK) only 11 women held executive directorships and of these only 7 are on the main board. The small percentage of women in this study is therefore felt in keeping with the overall trend for women at senior management levels.

The distribution by age is shown in Tables 5.4 and Figure 5.1. The median age is 41 to 50 and represents 53% of the sample (males and females); 66% of the sample had a first degree or higher, eg., PhD, as shown in Table 5.5 and Figure 5.2. Some executives also had professional qualifications such as Chartered Accountant, and at least five had MBAs. These data were not always collected and have therefore not been included in the final analysis.

The distribution by function is shown in Table 5.6 and Figure 5.3. The top three functions represented were managing directors of separate businesses within the 16 organisations (27% of the sample), finance directors (18%) and personnel (9%). The miscellaneous category includes functions where there were two or fewer. This is felt to be a reasonable spread across the functions typically found in large organisations.

Table 5.7 and Figure 5.4 show the distribution of Myers-Briggs Type Inventories (MBTI) by individual profile and core types. The higher proportion of NT core types (51%) is probably a reflection of the higher proportion of senior managers in this study (Gardner and Martinko, 1996).

5.3 The Organisations

Each organisation (except L and K)is, as indicated, a quoted company trading on either the UK stock exchange or that of its geographic head office. It was felt that to provide any more information on the organisation such as turnover and number of employees would compromise the executive's anonymity, as an astute reader could very easily identify the organisation. For this reason, therefore, no additional hard data are provided on the organisations.

The overall culture of each organisation could only be assessed at the surface level (Schein, 1992a) using the interview and background data. It appeared that the traditional role (bureaucracy) culture (Handy, 1981) was predominant. For example, executives would talk about the formal procedures for obtaining resources, operational policies, the organisation being slow to change, their position and the privileges they enjoyed as a result of their position within the organisation. These are phenomena one might associate with a role culture (Handy, 1981). Indeed, some executives were quite explicit in saying that their organisation was bureaucratic and one of their principle objectives was to make it more responsive and task driven. The exceptions were organisation C and P, whose executives talked much more about being driven by the need to execute tasks quickly by whatever means they had at their disposal, and gave the impression of belonging to organisation with more of a power culture. Given the difficulties of identifying the culture of an organisation (as discussed in Section 3.10.3), it would be in-appropriate at this stage to be more precise about organisations' cultures. Therefore, whilst the organisations represented a fair spread of industrial sectors, they may not represent such a fair spread of organisational cultures.

5.4 Presentation of the Data Analysis and Results

Using the analysis procedures described in Chapter 4, three main themes (sets of interconnected categories) emerge from the data. First, a set of categories related to the level of executives' overall level of expertise with the computer in terms of the range of software used, their breadth of expertise with the software, the frequency with which they use the PC, and how this overall competence had changed with time. Second, a group of issues related to how they operated as managers and within that their personality as depicted by their MBTI profile, for example the benefits, downsides and barriers to personally using the PC. Third, there are the non-users who are different from the users, not just in terms of their

physical use of the PC, but also in their total perspective on how they operate as managers. The proceeding chapters contain the results and analysis of the interviews as follows.

Chapter 6 Results I - Patterns of Computer Usage
The range of software used, the depth and breadth of the users' expertise, and how their use of the computer has changed over time.

Chapter 7 Results II - Benefits of Using the Computer and Managerial Roles
The relationship between the tasks for which they use the PC, the benefits and barriers to use and the executive's managerial role and MBTI profile.

Chapter 8 Results III - The Non-Users
The non-users compared to the users.

Chapter 9 Conclusions and a Proposed Model of Executive Use of the Computer
A summary of the results and proposed model of use based on the results.

Table 5.1 Organisational Background Information

Code	Sector (as per the Financial Times UK Share Classification, January 1996)	HQ Location	Number Interv'd	Number Used	% Sample
A	Electronics & Electrical Equipment - Manufacturer	Japan	2	2	2
B	Telecommunications	USA	5	5	6
C	Leisure & Hotels	UK	7	7	8
D	Engineering, Vehicles - Manufacturers	UK	10	8	9
E	Food Producers	USA	5	5	6
F	Water	UK	8	8	9
G	Life Assurance	UK	5	5	6
H	Banks	UK	6	6	7
I	Support Services	UK	5	0	0
J	Life Assurance	Canada	5	4	5
K	National Health Trust	UK	7	3	3.5
L	Government Agency	UK	5	5	6
M	Pharmaceuticals	UK	9	9	11
N	Media (Newspapers)	UK	4	4	5
P	Transport, Security and Health Care	Australia	3	3	3.5
Q	Tobacco	UK	6	6	7
R	Retailers (General)	UK	5	5	6
S	Health Care	UK	6	0	0
	Totals		103	85	100

Note: % Sample refers to the percentage of the final sample of 85 executives.

Table 5.2 Executives' Sociodemographic Data

Code	Title	Gender	Age	Educat'n	User Type	MBTI Profile			
A1	Commercial Director	Male	>50	BSc	EU-I	I(17)	S(3)	T(27)	J(35)
A2	Managing Director	Male	>50	A-Level	Novice	I(31)	S(21)	T(11)	J(51)
B1	Managing Director	Male	41-50	BSc	Expert	E(27)	N(17)	F(21)	P(31)
B2	Project Director	Male	>50	BSc	EU-II				
B3	Manager Operations	Male	41-50	BSc	EU-I	I(13)	S(25)	T(9)	P(23)
B4	Finance Director	Male	41-50	None	EU-I	E(7)	S(7)	T(19)	P(37)
B5	Head Transmission Project	Male	<40	BSc	EU-I	I(15)	N(7)	T(5)	J(17)
C1	Managing Director	Male	41-50	HNC	Expert	E(33)	N(17)	T(17)	P(7)
C2	Managing Director	Male	<40	None	Non-User	E(23)	N(17)	T(45)	P(19)
C3	Finance Director	Male	>50	BSc	EU-I	I(21)	N(7)	T(35)	J(29)
C4	Chief Executive Officer	Male	41-50	BA	EU-I	I(21)	N(23)	T(35)	J(9)
C5	Director of Finance	Male	41-50	None	Non-User	I(53)	S(65)	T(45)	J(21)
C6	Managing Director	Male	<40	A-Level	EU-I	E(9)	N(39)	T(17)	P31)
C7	Finance Director	Male	<40	BA	EU-I	E(31)	N(17)	T(47)	P(37)
D1	Director Finance	Male	<40	A-Level	EU-I	E(5)	S(5)	T(35)	J(47)
D2	Quality Director	Male	41-50	BSc	Non-User				
D3	Personnel & HR Director	Male	>50	City & Guilds	Novice	E(8)	N(1)	T(17)	P(0)
D6	Head of Operations	Male	<40	BSc	EU-I	E(23)	N(1)	T(15)	J(35)
D7	General Manager	Male	>50	BSc	EU-I	I(27)	N(9)	T(25)	J(5)
D8	Head MIS	Female	41-50	BSc	EU-I	E(21)	N(23)	T(31)	J(3)
D9	Director Q&A	Male	>50	PhD	Non-User	I(27)	N(35)	T(5)	J(23)
D10	Group Personnel Director	Male	41-50	BSc	EU-II	I(31)	N(31)	T(37)	P(33)
E1	Operations Manager	Male	>50	PhD	Novice	I(45)	S(1)	T(39)	J(49)
E2	General Manager	Male	41-50	LRSC	Expert	E	N	T	P
E3	Vice President HR	Male	>50	BSc	Non-User	I(5)	N(13)	T(21)	P(23)
E4	European General Manager	Male	<40	BSc	Expert	I(15)	N(19)	T(57)	J(11)
E5	Vice President Europe/MD UK	Male	41-50	BSc	EU-I	E(13)	N(37)	T(35)	J(7)
F1	Deputy MD	Male	41-50	BSc	Novice	I(1)	N(29)	T(1)	P(15)
F2	Investment Manager	Male	<40	BSc	EU-II	E(19)	S(9)	T(51)	J(15)
F3	Deputy Head Regulation & Planning	Male	41-50	BSc	EU-I	I(11)	S(19)	T(5)	J(55)
F4	Finance Director	Male	41-50	BSc	EU-I				
F5	Quality Systems Manager	Male	41-50	BSc	Expert	E(23)	S(13)	T(25)	J(21)
F6	Divisional Director	Male	41-50	BSc	Non-User	I(41)	S(9)	T(29)	J(11)
F7	General Manager	Male	>50	O-Level	Novice	E(51)	S(33)	T(11)	J(33)
F8	Divisional Director	Male	41-50	BSc	Novice	E(15)	S(15)	T(39)	J(41)
G1	Marketing Manager	Male	41-50	A-Level	EU-I	I	N	T	J
G2	Systems Strategy Manager	Male	41-50	MSc	EU-II	I(3)	N(41)	T(9)	P(33)
G3	Operations Director	Male	41-50	BA	EU-I	E	N	T	J
G4	Employment Development Manager	Male	41-50	BA	EU-II	I	N	T	P
G5	Field Operations Strategy Project Manager	Male	41-50	PhD	EU-I	E(49)	N(45)	T(3)	P(41)

Table 5.2 Executives' Sociodemographic Data (cont'd)

Code	Title	Gender	Age	Educat'n	User Type	MBTI Profile			
H1	Director New Business	Male	41-50	O-Level	Novice	I(25)	N(13)	T(27)	P(17)
H2	Finance Director	Female	<40	BA	EU-II	E(35)	N(37)	F(3)	J(1)
H3	Head of Personnel	Female	<40	O-Level	EU-II	I(33)	S(35)	T(61)	P(33)
H4	Director Credit Control & Risk	Male	>50	BSc	Novice	I(9)	S(43)	F(1)	J(35)
H5	Managing Director	Male	41-50	O-Level	EU-I	E(9)	N(37)	T(25)	J(3)
H6	Head of Systems Development	Male	<40	BA	Expert	E(5)	S(23)	T(39)	J(15)
J1	Managing Director	Male	>50	None	EU-I	I(11)	N(9)	T(27)	P(29)
J3	Divisional Head	Male	41-50	O-Level	EU-I	I(13)	N(21)	T(29)	J(39)
J4	Director Client Services	Female	41-50	O-Level	EU-I	E	N	T	J
J5	Assistant Vice President IS	Male	>50	None	EU-II	I(7)	S(1)	T(3)	J(35)
K1	Director Nursing	Female	<40	DipMan	EU-II	E(1)	N(23)	T(19)	J(5)
K5	Chief Executive	Male	41-50	DipHE	EU-I				
K7	Director Corporate Development	Male	41-50	None	Novice				
L1	Head of Strategy	Male	41-50	MA	Novice	E(7)	N(19)	T(19)	P(9)
L2	Head of Strategy	Female	41-50	BSc	EU-I	I	N	T	P
L3	Director of Operations	Male	>50	BSc	EU-I	I(15)	S(9)	T(15)	J(29)
L4	Director X Division	Male	41-50	BSc	Expert	I(13)	N(23)	T(23)	J(11)
L5	Director Y Division	Male	41-50	PhD	Expert	E(21)	N(19)	T(21)	P(21)
M1	Company Secretary	Male	41-50	LLB	EU-II	I(17)	S(37)	T(37)	J(13)
M2	Finance Director	Male	41-50	BSc	Non-User	E(11)	N(9)	F(3)	P(3)
M3	Group Financial Controller	Male	>50	BSc	Novice	E(9)	N(39)	T(11)	P(17)
M4	Finance Director	Male	>50	BSc	EU-I	E(33)	N(43)	T(33)	J(27)
M5	Group HR Director	Male	41-50	BA	EU-I	E	N	T	P
M6	HR Director	Male	>50	PhD	Non-User				
M7	Director of Internal Audit	Male	>50	None	EU-I	I(5)	S(9)	T(51)	J(51)
M8	Market Development Director	Male	41-50	BSc	Novice	I(29)	N(37)	T(19)	P(37)
M9	Customer Development Director	Male	<40	BSc	Novice	E(17)	N(19)	T(41)	J(5)
N1	Production & IT Director	Male	41-50	O-Level	Novice	E(29)	S(33)	T(25)	J(41)
N2	Advertisement Sales Director	Female	<40	BA	EU-I	E(17)	N(3)	T(43)	J(23)
N3	Assistant Sales & Marketing Director	Male	<40	BSc	EU-I	E(25)	N(41)	T(31)	J(1)
N4	Group Financial Controller	Male	41-50	HNC	EU-I	I(19)	N(41)	T(37)	P(33)
P1	Chief Executive Officer	Male	41-50	BA	Expert				
P2	Director Finance & Administration	Male	41-50	BA	EU-I				
P3	Director Business Planning	Male	<40	BSc	Expert				

Table 5.2 Executives' Sociodemographic Data (cont'd)

Code	Title	Gender	Age	Educat'n	User Type	MBTI Profile			
Q1	Head Group Corporate Control	Male	>50	BSc	Novice				
Q2	Group Management Development Adviser	Male	>50	O-Level	Novice	E	N	T	P
Q3	Head of Legal Department	Male	>50	BSc & LLB	Novice				
Q4	Regional Director	Male	41-50	BSc	Novice				
Q5	Director Tobacco	Male	>50	BSc	Novice				
Q6	Group Finance Controller	Male	41-50	BA	Novice				
R1	Director UK Retailing Logistics & Supply	Male	>50	O-Level	Non-User	E(35)	S(25)	T(5)	J(19)
R2	Director UK Retailing IT	Male	41-50	A-Level	EU-II	E(51)	N(19)	T(27)	P(7)
R3	Director Product Marketing	Male	41-50	BA	EU-I				
R4	Finance Director	Female	41-50	OND	EU-I	I(25)	S(41)	T(21)	J(53)
R5	Development Director	Male	>50	A-Level	Non-User	E(3)	S(43)	T(19)	J(37)

Notes

In organisations C, D, M and R the executives were drawn from different operating divisions, hence the apparent duplication of titles.

Educat'n represents the highest academic qualification. None = left secondary school with no formal academic qualifications.

In some cases individuals had recently done an MBTI and gave the profile at the interview - on these occasions the strength of the MBTI profile is not quoted as it was not usually known.

Table 5.3 Sample Composition by Gender

Gender	Number	% Total Sample
Female	8	9
Male	77	91
Total	85	100

Table 5.4 Sample Composition by Age

Age (in years)	Number	% Total Sample
Under 40	16	18.82
41-50	45	52.94
Over 50	24	28.24
Total	85	100

Figure 5.1 Sample Composition by Age

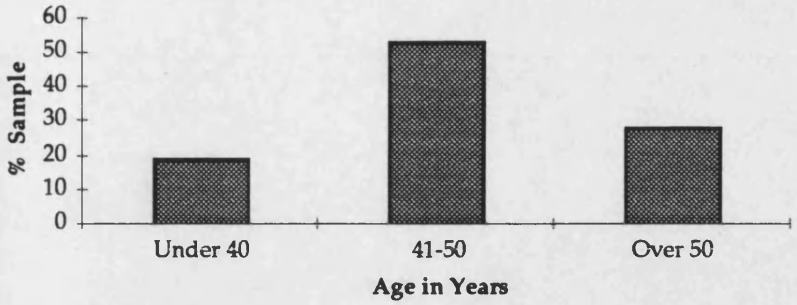


Table 5.5 Sample Composition by Academic Qualifications

Qualification	Number	% Total Sample
None	7	8.24
Below BSc, eg., HNC	22	25.88
BSc	49	57.64
Above BSc, eg., PhD	7	8.24
Total	85	100

Figure 5.2 Sample Composition by Academic Qualifications

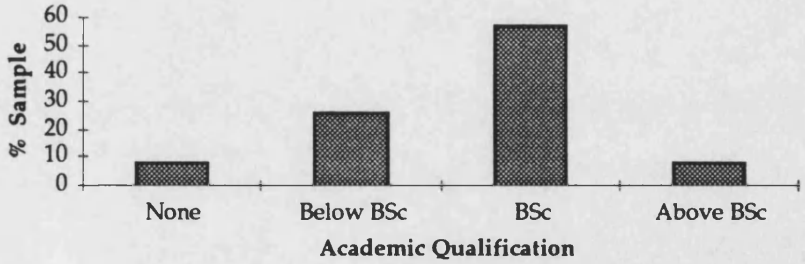


Table 5.6 Sample Composition by Function

Function	Number	% Total Sample
Managing Director	23	27.06
Finance	15	17.65
HR/Personnel	8	9.41
Sales	7	8.24
IT	6	7.06
Strategic Planning	5	5.88
Operations	5	5.88
Marketing	4	4.70
Q&A	3	3.53
Special Projects	3	3.53
Miscellaneous	6	7.06
Credit Control (1)		
Dir. Nursing (1)		
Legal (2)		
Internal Audit (1)		
Logistics (1)		
Total	85	100

Figure 5.3 Sample Composition by Function

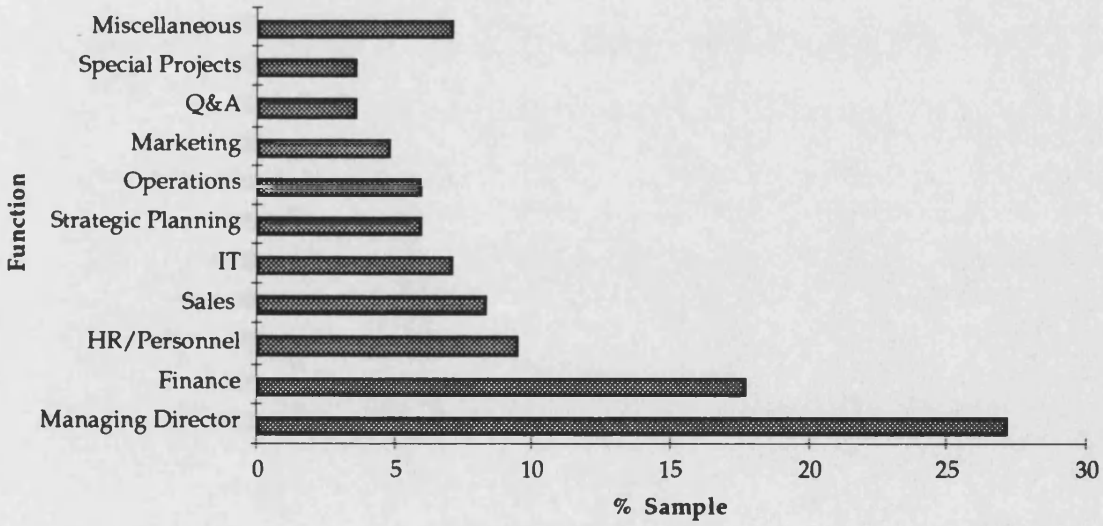
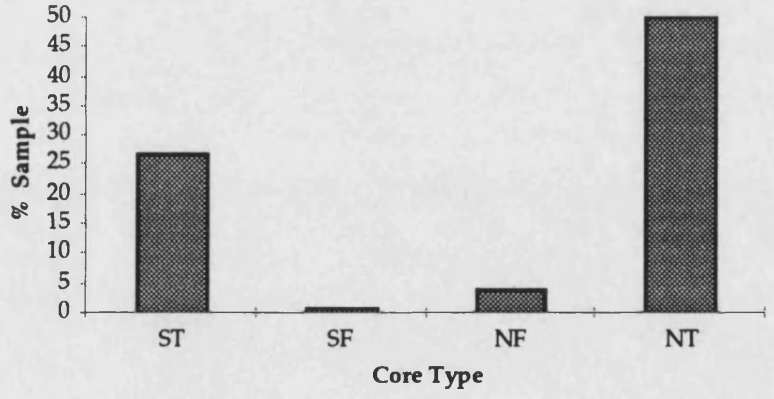


Table 5.7 Distribution of MBTI Profiles

Profile	Number	% Total Sample	Core Types
ISTJ	11	12.94	
ISTP	2	2.35	
ESTP	1	1.18	
ESTJ	9	10.59	
			ST = 23 (27.06%)
ISFJ	1	1.18	
ISFP	0	0	
ESFP	0	0	
ESFJ	0	0	
			SF = 1 (1.18%)
INFJ	0	0	
INFP	0	0	
ENFP	2	2.35	
ENFJ	1	1.18	
			NF = 3 (3.53%)
INTJ	9	10.59	
INTP	10	11.76	
ENTP	13	15.29	
ENTJ	11	12.94	
			NT = 43 (50.56%)
Unknown	15	17.65	
			Unknown = 15 (17.64%)
Total	85	100	

Figure 5.4 MBTI Core Types Distribution



CHAPTER 6 - Results I - Variations in use of the Computer with Time

This chapter discusses the range of software used, the depth and breadth of the executives' expertise with the software, the frequency of their use of the computer, how they developed their expertise, and how their use of the computer has changed with time in terms of the range of software, expertise and frequency.

6.1 Introduction

Executives were asked first to describe how they currently use their PC in terms of the software and the nature of the tasks for which it was used. Using the 'Use Over Time' template shown in Appendix C as a prompt, they also described how their use of the PC had changed since they first used a PC. Of the 78 executives who had used a computer as a management tool 42 (53.4%) drew their own graph. The level of detail and care with which the graphs were drawn varied from quick and not much detail to meticulous with 'thick' descriptions about how their use had altered, as shown in Section 6.7. In other cases they described their use and a graph was subsequently reconstructed from the interview tape.

The purpose of this part of the interview was to explore how executives' competence (expertise) and frequency of use had developed over time, and in particular:

- the current level of expertise amongst the executives interviewed;
- the process the executives went through to achieve their current level of expertise;
- changes in their use of the PC over time and especially the range, depth and breadth, and frequency of their use of PC software;
- the episodes and encounters which led to these changes in use.

The original intention had been only to explore the executives' use of PC based personal productivity tools rather than any mainframe MIS and EIS software. However, as the interviewing progressed it quickly became clear that in many cases, despite what the popular press would have one believe, mainframe MIS systems are alive and still being extensively used. Indeed in some organisations, and in particular Organisations F, J and H, the mainframe was the dominant system and formed the backbone of the software used, such as e-mail and word

processing, and spreadsheets in the case of F. In most cases the executives used a mix of mainframe and PC software.

6.2 Length of Time as a User and Frequency of Use

Executives were asked to estimate how many years they had been using a computer and roughly how much time they currently spent using one. The distribution of time as a user is shown in Table 6.1 and Figure 6.1. Half (50.1%) had been using the computer in some form or another for over ten years, whilst 23.5% had used one for between five and ten years. Of the seven who currently did not use one in the office, three had never used a computer during their entire working life (C5, R1 and R5). The other four had used a computer at some point, albeit either as an integral part of a previous job, eg., research scientist, engineer, or for social purposes, but not as a management tool.

The question of frequency of use was open ended; a considerable variety of responses were obtained, from the broad 'occasionally', to the more precise response of 'about 30 to 45 minutes per day'. Some who did not have any type of portable PC, such as a laptop, talked about using the PC only when they were in the office, which in most cases was not every day. Others felt frequency was more about instances of use and queried what one counted as use, as exemplified by this quote from executive F1.

> '... it's not about hours, it's about instances of usage. I (may) get fifteen communications that come to me in a day with attachments. ... Do I count the usage as sitting there reading off the screen? And is it a one page report or two page report? ... So amount of use per day is (not easy to estimate). I mean I will log in and out. If I'm here all day I'll be at the machine a dozen times in the day. ... I doubt that at the absolute maximum I would spend two hours in a day ...'
>
> Executive F1

Taking this into account, and the experience of Mintzberg (1973) and Stewart (1967) about executives' ability to estimate how they allocate their time and the variety of responses, it was decided to categorise frequency of use according to one of five broad categories: never, occasionally, monthly, weekly, and daily as shown in Table 6.2 and Figure 6.2.

Table 6.1 Length of Time as a User of the Computer as a Management Tool

Years (Y) as User	Never	Y < 2	2 > Y < 5	5 > Y < 10	Y > 10	Total
Number	7	9	6	20	43	85
% Total Sample	8.23	10.59	7.06	23.53	50.59	100

Figure 6.1 Length of Time as a User of the Computer as a Management Tool

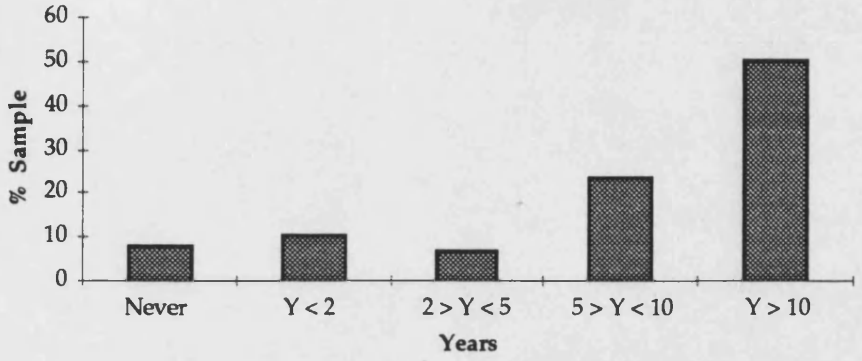
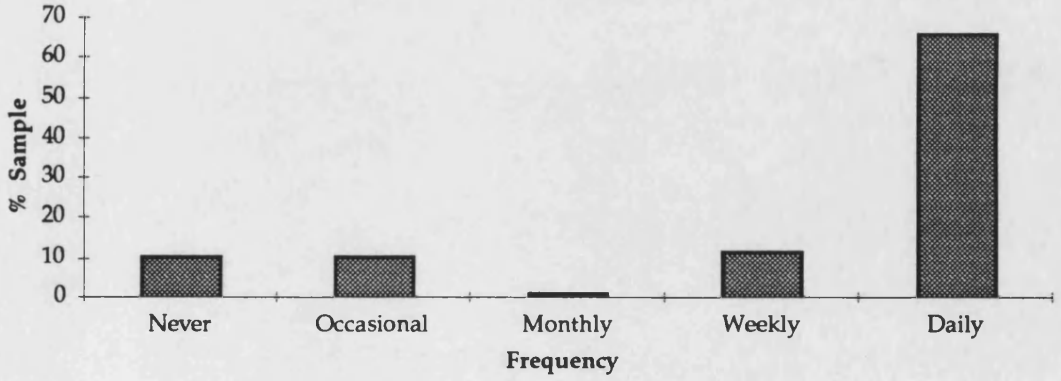


Table 6.2 Frequency of Use

Frequency of Use	Never	Occasional	Monthly	Weekly	Daily	Total
Number	9	9	1	10	56	85
% Total Sample	10.59	10.59	1.18	11.76	65.88	100

Figure 6.2 Frequency of Use



Just over half the total sample (65.9%) use the PC on a daily basis, which represents 74.7% of the user population. The difference between the number of executives (7) who have never used the computer as a management tool and the number who currently do not use one (9) takes account of two users (D6 and D9) who had previously been users but had stopped at the time of the interview. The duration of use within a day varied from less than 30 minutes for an executive who just uses the PC to read his e-mail, to about 5 hours for an executive such as F3, whose function is to produce strategy and procedures to meet government regulations. Within a day, the frequency of use also varied from a one-off session to several sessions as illustrated by these and F1's earlier comments .

'It goes on when I arrive in the morning. It goes off when I leave at night. And it may be doing nothing for an hour or two and then it will be in to action. It's that kind of thing. ... It's very much a tool like a telephone. ... Some of the most important things you do are on a telephone and equally on a computer.'

Executive J1

'Every so often things just get to the point where I have to get out of the office and get some stuff done, on the PC at home. ... I'll spend three days at home and bash my way through it, and there'll be like five or six versions by the time I've finished.'

Executive C7

6.3 Range of Applications Used

The different types of software used are summarised in Table 6.3(a) and Figure 6.3. The dominant and prevalent use of e-mail in this study is felt primarily to reflect the fact that within six organisations (A, B, F, H, J and P) it is the organisational culture to use e-mail as epitomised by the following quote.

'ZAP is like the telephone ... (The company we just merged with) cannot function within the J environment unless they are part of ZAP. ... You have to check it. People need an answer. That's the way they expect to get an answer. That's the culture that's grown up in J, and it stretches across all territories.'

Executive J4

'.... during that time (maternity leave), the best thing I got out of it (the PC), was the communications with the team. I just knew what was going on here on a day-to-day basis, by spending probably about twenty minutes, half an hour a day just seeing what was

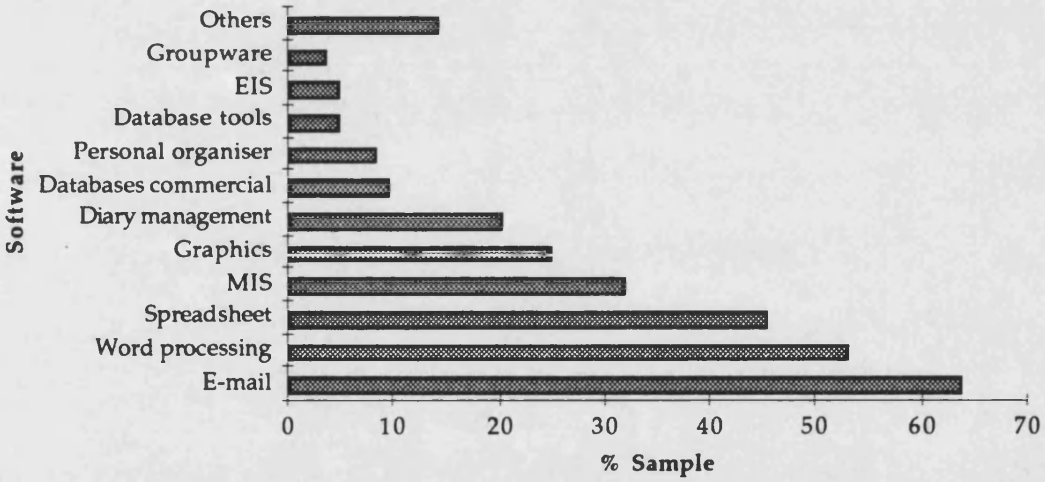
going through the electronic mail system. When I came back I knew everything that had happened while I was away. There was no catching up time. It was excellent.'

Executive H2

Table 6.3(a) Types of Software Used

Software	Number of Users	% Total Sample
E-mail	54	63.53
Word processing	45	52.94
Spreadsheet	43	45.26
MIS	27	31.76
Graphics	21	24.71
Diary management	17	20.00
Databases commercial	8	9.41
Personal organiser	7	8.24
Database tools	4	4.71
EIS	4	4.71
Groupware	3	3.53
Others: eg., journey planning and project management	12	14.12

Figure 6.3 Types of Software Used



In all the organisations, except organisation F, the norm was for all employees including executives to handle their own e-mail, that is read and respond to them. Thus for 21 executives in this study use was mandatory. In the other organisations e-mail was available (except in parts of Organisation D) but it had either only recently been implemented and was not yet part of the organisational culture (eg., Organisation K), or where it had been available for some time direct use was optional (eg., in Organisations C, E, F, and L). When mandatory use is

excluded, e-mail becomes the third most used software package (33 users), after word processing (45 users) and spreadsheets (43 users). It is interesting to note the growth in the use of word processing.

In previous studies the spreadsheet has tended to be the dominant software as summarised in Table 6.3(b). In the main, these previous studies comprised mixed levels of management, with the exception of those by King *et al.*, (1992) and McKinnon and Burns (1992) which comprised mainly senior executives. The comparably low use of other software, such as graphics and database software, is similar to that found in other studies cited in Table 6.3(b), although the overall use is lower than that found in other studies such as that of Igbaria *et al.*, (1989) and Vlahos and Ferratt (1995).

There may be a number of reasons for this variation in use including the level of seniority of the managers in the different studies. First, as noted, only the studies of McKinnon and Burns (1992) and Vlahos and Ferratt (1995) focused primarily on senior executives. The Vlahos and Ferratt (1995) study comprised both large and medium-sized organisations and there may be a tendency, as others have found (eg., Martin, 1988), for executives in the latter case to make more direct use of the computer.

Table 6. 3(b) Use of Certain Software in Other Studies

Study	Sample Size	% Spread-sheets	% Word Processing	% Graphics	% Database
Lee (1986)	311	74	44	29	29
Igbaria *et al.*, (1989)	471	94	63	51	41
Mason and Wilcox (1991)	53	90	*	*	*
Ein-Dor and Segev (1992) (Israeli Managers)	66	15	9	1	23
Ein-Dor and Segev (1992) (American Managers)	108	22	24	6	6
King *et al.*, (1992)	500	59	64	57	*
McKinnon and Burns (1992)	73	23	5	5	*
Vlahos and Ferratt (1995)	55	62	42	40	42
This Study	85	50	53	25	5

Note: * = no figure stated. For continuity all % figures were rounded up to whole numbers.

Second, there may be international culture differences. All the studies were based on American executives except that of Vlahos and Ferratt (1995) which was based on Greek executives, and Wilcox and Mason (1991) which was based on New Zealand managers. Some authors have found the types of software used

vary across different countries (for example, Ein-Dor and Segev, 1992; Igbaria *et al.*, 1995a; Igbaria and Zviran, 1996).

Although executives were asked to focus on their use of PC software, for some accessing, a mainframe MIS was the only use they made of the computers, eg., interrogating a sales database for trends .

The range of software (number of different packages) used is summarised in Table 6.4(a) and Figure 6.4(a). This varied from those who use only one package (18.8%), which was mainly e-mail, to those who use more than six packages (4.7%). The median was three packages. Table 6.4(b) and Figure 6.4(b) show the range of packages used correlated by age, which suggests that younger executives (under 50 years old) use a greater range than older executives (over 50 years old). The chi-square value was calculated as 11.52 which indicates that this relationship is statistically significant $p<0.10$. The uses made of the software is discussed in Chapter 7.

Table 6.4(a) Range of Software Used

Number of Software Packages Used	Number	% Total Sample
None	9	10.59
One	16	18.82
Two	15	17.64
Three	18	21.18
Four	9	10.59
Five	6	7.06
Six	8	9.41
>Six	4	4.71
Total	85	100

6.4 Purpose of Use and Number of Computers

The number of computers each executive had is summarised in Table 6.5 and Figure 6.5. Nearly half (43.5%) had two computers, usually a combination of either two desktops (one at home and one in the office) or a desktop and laptop or hand-held device such as a personal organiser. Although nine executives did not use a PC at work, three used it at home for work related tasks.

Figure 6.4(a) Range of Software Used

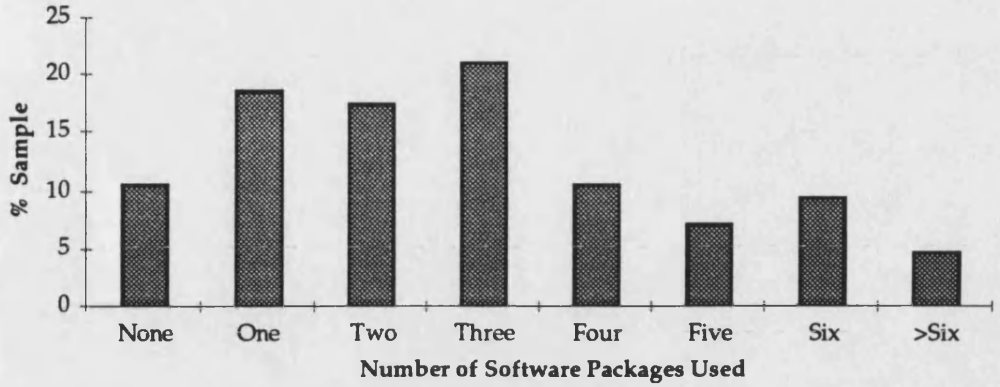


Table 6.4(b) Distribution of Range by Age

Range of Software	Age in Years			Total
	<40	41-50	>50	
0	1	3	5	9
1 to 3	5	27	17	49
>4	10	15	2	27
Total		45	24	85

Figure 6.4(b) Distribution of Range by Age

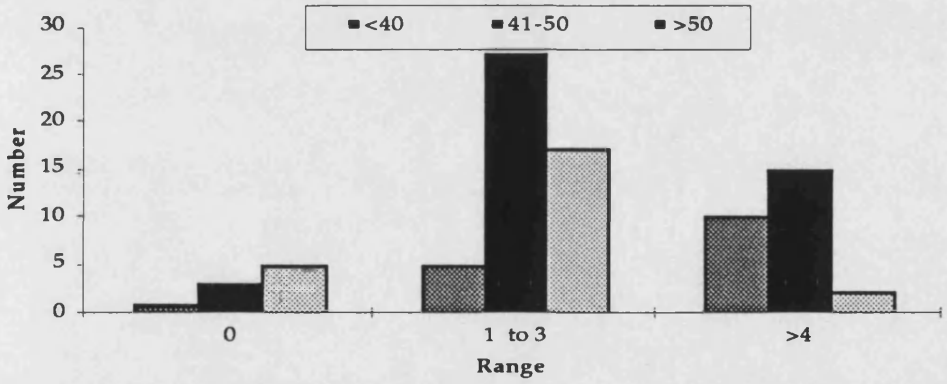
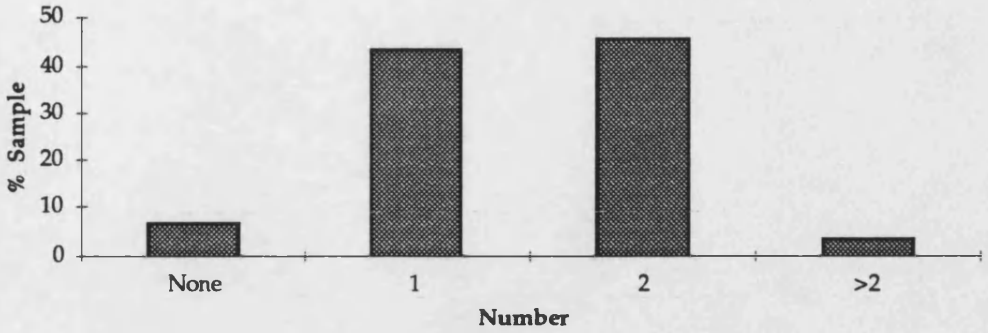


Table 6.5 Number of Computers Owned By Executives

Number of Computers	Number of Executives	% Total Sample
None	6	7.06
1	37	43.53
2	39	45.88
>2	3	3.53
Total	85	100

Figure 6.5 Number of Computers Executives Owned



Information on social use was not a specific area of interest, but it became apparent early on in the study that several executives did use the PC at home for non-work-related activities. Therefore, wherever possible this information was elicited. The data in Tables 6.6 and 6.7 and Figures 6.6 and 6.7 reflect those instances where this area of use was explored. Actual use for social purposes may in reality be slightly higher than shown.

Table 6.6 Purpose for Which Executives Used Their Computer

Purpose	Number of Executives	% Total Sample
None	6	7.06
Work	44	51.76
Social	3	3.53
Work and Social	32	37.65
Total	85	100

The term finance covers tasks such as preparing an income tax return, producing personal budgets, analysing personal share portfolios and tracking the bank balance. The term education is used to cover those instances where the interviewee talked about using the PC for personal development. For example, at least two executives spoke about using CD-ROMs to look up information related to a hobby. In three instances the executives cited use of the PC to compile databases of *objets d'art* they collected as hobbies.

Figure 6.6 Purpose For Which Executives Used Their Computers

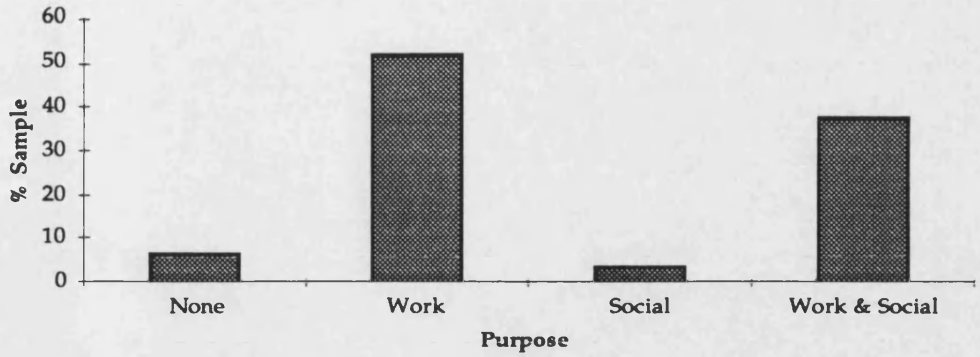
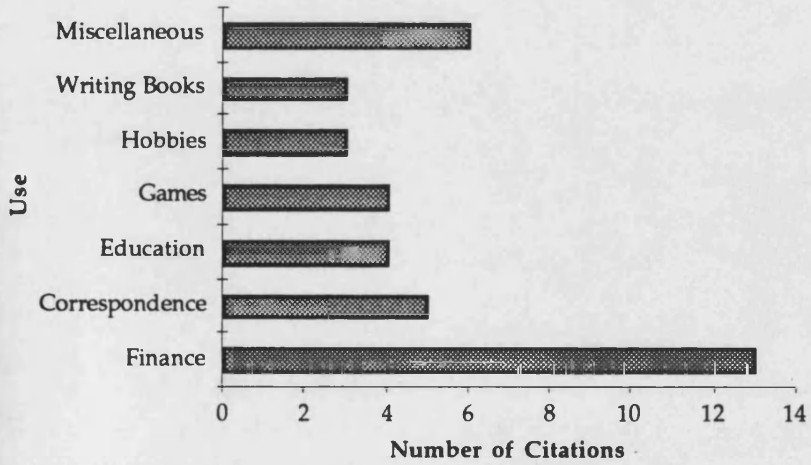


Table 6.7 Social Use of the Computer

Purpose	Number of Citations
Finance	13
Correspondence	5
Education	4
Games	4
Hobbies	3
Writing Books	3
Miscellaneous eg., for addresses and the Internet	6

Figure 6.7 Social Use of the Computer



6.5 Level of Expertise - An End-User Framework for Executives

Whilst the range of software used and frequency of use provide some picture of the executives' expertise with the computer, they give only a superficial understanding of executives' level of expertise. For example, if one compared two executives who use only one package, is it realistic to regard the level of competence of the one whose only use is e-mail as equal to that of the one whose only use is a spreadsheet, especially if the latter develops his own? The end-user framework devised by Rainer and Harrison (1993) was used to guide sponsors when selecting executives for interviewing, as discussed in Section 4.4 and shown in Appendix D. Such a framework was also felt to be useful for grouping the executives during the data analysis. In the following Sections 6.5.1 to 6.5.4 the characteristics of each type of user are explored using this framework.

6.5.1 Novice-User (The Beginner)

Novice users typically use only e-mail and/or a traditional mainframe system or where it is available an EIS. They probably read and respond to their e-mail when they are in their office, and may access it remotely. Their frequency of use may be daily and they may well log in and out several times a day. Whilst they will reply to their own e-mails this is often the extent of their word processing capability and if it is a longish document they often turn to the secretary for help. For example, returning to F1 who estimates he receives about 100 e-mails a week:

> 'wherever I am (within the organisation) I log in somewhere ... I'm pretty flexible. ... Most of them (e-mails) I do. It's just occasionally if I'm doing some dictation and I'll say, oh, can you send that out' ... (usually when he is away from the office and hasn't had a chance to log in). 'I'm not regimented in the sense that, if it's so and so, if it's longer than a page she'll do it, if it's shorter than a page I'll do it.'
>
> Executive F1

Often they see using the computer as hard:

> 'I am okay most of the time on the standard system; every now and again someone puts something on there which I have slightly more difficulty with (but) I grope my way through that'.
>
> Executive A2

'I suppose I must start from the premise that it's all hard ... Gradually you start off with your prompts ... They give you these (the user guides) and you stick those on the side ... I've got no time to read them. But in the early days you're reading the screen and you're thinking, and where's the cursor, oh right that's got to be up there. Those things are not intuitive to start off with. And you know you've got to get to a point of it being intuitive and then you can move on from there.'

Executive F7

Their desire to make further use of the computer is often limited and their knowledge about how the computer can help them is along the lines of 'knowing how'. One could argue that by making use of the PC when use is optional they have moved to the 'knowing that' state. Nonetheless, in general their use is very much, more of the same, with no inclination to move forward. For example, A2 talking about the use of spreadsheets word processing and graphics:

'... is done for me and I don't have a strong desire to take that on myself, ... I have most of the information I want and if there is anything I want I ask for it and get it very quickly. That's one of the reasons I've got an open mind but at present I don't feel I am missing anything by not using it for number crunching myself.

Executive A2

This executive uses an EIS and e-mail and is very positive about the value of them. Yet it is as though, having moved to the 'knowing that', he has moved back to the 'knowing how' state. E1, whilst a daily user of a mainframe MIS system to check stock levels shows no desire to use the PC.

'Perhaps I could, I mean it may well be that technology has got to the point, that I haven't really kept it up, and perhaps I could do it at home on (a) laptop. I haven't really given it serious thought. I guess my way of behaving was formed over the last dozen years. I haven't really re-examined it in the light of now the more available and cheaper laptops and better ways of using them, and so on.'

Executive E1

These are only broad groupings and there are always exceptions, such as F1 who uses his e-mail system for a number of other tasks, as discussed in Chapter 7. Lastly, as far as support is concerned, the novice will often call on his colleagues such as either his secretary, or a member of his team, etc., although, as we have seen in A2's case they will sometimes try to muddle along.

6.5.2 End-User I (The Intermediate User)

Typically the end-user I will use up to four packages which include spreadsheets and/or some form of word processing, as well as e-mail where it is available. More often they predominantly use just one or two packages regardless of their suitability. For example, whilst they might prepare their own presentations this is usually done by using either word processing or spreadsheet software as opposed to specialist graphics software which an end-user II would use. They may prepare long documents and hand them over to their secretaries for completion and distribution. The depth of their expertise with the software they use is less than that of the more experienced users and in some cases might be described as superficial.

> 'I use everything at a very basic level, it just gives me what I want ... (but I need help with) ... sophisticated tasks such as moving data between spreadsheets and word processed documents.'
>
> Executive F3

> '... I think that for every package that I've ever worked on, I probably only know 20% of the package. There's 80% locked away inside that I've never needed to know, therefore I've not bothered. Whereas if I was better I would try and find out how to get the extra benefit.'
>
> Executive D1

The software they use often depends on the purpose of use and what they first learned to use. For example, F3 who is the Deputy Head of Regulations for a public utility has to spend much of his time writing reports and predominantly uses word processing. For others, for example Executive D7, the spreadsheet is the dominant software used to 'store and manipulate data which I receive', and he sees word processing 'as the next step'.

Frequency of use may be daily, especially where there is some form of e-mail. However, in most cases when it comes to using software other than e-mail it is on a less regular basis.

> '(My) use of spreadsheets comes in fits and starts. ... There's a period when I've got a particular task to do when I use it a lot, and then there can be two months when I won't touch it.'
>
> Executive J4

Not unlike the novice, this end user often looks to colleagues for help and is in some respects fixed in their way of doing things. Some see using the PC as a hassle as exemplified by the extract below from B5.

> 'One of the difficulties that I've always found with computers is this printer interface, it seems to be almost black art. It isn't always as straightforward as you would think, it always seems to be quite a **hassle**. ... no one's ever really standardised on an interface between a computer and a printer. That's always been one of my biggest problems in terms of completing (a document).'
>
> Executive B5

Others are more inclined to talk enthusiastically about their use of the PC, often obtaining some enjoyment from what they do:

> 'It's **fun** ... I find it creative. I've always enjoyed building things and making things. I wouldn't' say I'm terribly good at it. But with the PC you actually do a lot of building and making ... That actually I find personally very interesting. It's quite **stimulating**. I was enormously proud of myself when I finished this model for running the accounts of (this charity), because I built it, from nothing.'
>
> Executive M7
>
> 'It's a **pleasure** to draft a presentation... ' Executive H5
>
> 'The **joy** of a word processor ... ' Executive J1

In some cases too they are keen to 'knowing beyond'

> 'I just needed to know what is possible, and what's beneficial and what isn't. ... Just as you need to be open minded to ways in which you can make the company more efficient all the time. ... You can't get it out of the book, you've really got to try it for yourself.'
>
> Executive H5

To some extent this 'knowing beyond' also reflects H5's MBTI profile of ENTJ and the visionary NT core. He is prepared to explore what the PC can do and then select the level of use which best suits him, as opposed to some (such as A2, D1 E1 and F3), who never try out other software, have the traditionalists' ST core, seem to remain in a state of either 'knowing how' or 'knowing that' and convey no sense of moving forward.

6.5.3 End-User II (The Advanced User)

At the next level of competence there are those who make more regular and extensive use of the computer and use a wider range of software than just e-mail, spreadsheets, word processing and the traditional MIS systems. A rough dividing line would seem to be around the use of graphics and presentation software. The end-user II emphatically uses these whereas the end-user I may not. The end-user II may be more inclined also to access external commercial databases than the previous groups of users.

Executive D10 (Group Personnel Director) is typical of an end-user II. He started by producing letters, some presentations, and spreadsheets for home finance, recipes and a database of his wine cellar. As a 'wine buff' he said he has an extensive cellar and was able to catalogue it by region, year, etc.

> 'So having set that up, my knowledge and understanding of things like files and all those other sorts of things, hard disc, ... then when I came here I could then actually see the practical application for work base.'

He produces all his own job offer letters by modifying the master which he has on his PC. He feels he is now slightly more computer literate than his secretary which he says is 'embarrassing'. Now he is able to give Jane files with his work on and she tidies it up and distributes it.

He feels he has not yet produced his own long documents; mostly he 'cannibalises existing documents' eg., contracts. He still hand writes things and dictates from time to time as this can still be quicker given his level of keyboard skills, although he said he was trying to improve these using a computer-based self-teach programme.

D10 constructed his own directors' salaries databases from the information that was available internally (within his organisation) on the computer and asked for a file on disc. In other cases he has constructed it himself in Lotus with manual data input, eg., the manpower planning model. He hopes to have the data on disc next time, but is not sure where each business is with respect to their use of the PC. For external data wherever it is possible he now receives it on disc.

> ' ... I wouldn't pretend it's complete, it's a progressive thing and I am sort of fairly voracious ... if I see something I'll just sort of try and suck it up ... 'cause I actually don't

know what's out there ... ' An example would be a presentation one of his colleagues did which included graphics he wanted to keep.

This group of end-users makes use of software other than e-mail on a very regular basis which in most cases would be daily or every other day. They also talk about the fun and to some extent the excitement they obtain from their use of the PC, and are often on the lookout for new ways in which it can support them.

'(I'm) an enthusiastic user, simply to see what new technology can bring for you, what benefits can it bring for you, rather than sit back and say, well, I'm sure it's all very good and someone will serve it up on a plate for you. I'm willing to try out new things ... '

Executive M1

'I would have a go at something, and if it worked I'd reflect on that, and think well, that worked, we'll maybe do something else, and then I'd experiment with something else and then I'd pull that into my operating methodology. So it didn't happen all at once. So there is more stuff on this than I've ever used. There's some things I've never opened.'

Executive G4

As users this group are generally able to support themselves but will call on selected colleagues when they are stuck. For example, M1 uses the on-line help as the starting point, then maybe the manuals, '... although they take quite a bit of working through, but by and large I can get a steer ...' but he will turn to one of two support people who he trusts and who understand his needs and have solved his problems in the past - '...people who respond quickly, who know what they are talking about, and I hate people who seem to be two pages ahead of me in the Windows handbook...'

Last, but by no means least, this group of users is often looking to 'know beyond' and seek new ways to use the PC as illustrated in the quotes from D10 and M1.

6.5.4 Expert Users

At the top of the scale again in terms of competence, there is a user who is in many ways quite different to all the others - the Expert User. The way in which the expert users talk can be highlighted by these extracts from E2 and C1.

E2's main use is the corporate database which he wrote (using a relational database application) to organise and analyse sales, reaction to enquiries,

and progress of project. 'We have all this information and that's the best way of trying to interpret those sorts of results and draw conclusions from them.'

His second most used software is word processing - '... it's often easier to send a fax or memo just by typing it yourself rather than, you know, asking the secretary to do it. That's just simply time saving, and I have little templates of these things that I have to do minimal work, just type in a little and there's the memo done.'

E2 will finish a document once he has started it, including attaching any attachments. Convenience decides whether he will do it or give it to his secretary, for example, if she has gone and he feels he needs to get the document out even if it 'takes half an hour' as he feels this makes 'more sense'.

His third use is external databases to access information relevant to his job. Fourth is AutoRoute (a journey planning package) which he uses quite a lot. Fifth is spreadsheets mostly for what ifs, and next month's results '... nothing very sophisticated...' Indeed he commented earlier that his uses of spreadsheets and word processing are in '... a routine way' as it's the databases which provide him with the main information. E2 keys in the data manually.

E2 does a lot of public speaking and '... feels uncomfortable with public speaking if somebody else has prepared the presentation for me.' So whenever he has the time he will do his own presentations using graphics software, and this is something he 'enjoys' '... It's the same thing as writing memos because it's no more difficult than doing that. When you're doing it, it looks a particular way and you think how that's going to go and ... you just make the changes until you get something that you think is going to flow in a sensible way.'

Other *ad hoc* uses include:

- a database to make sure all his team get the training they need;
- project and critical path analysis;
- reminders, to do lists, and a diary on his palmtop;
- personal contact database.

This is an executive who also fixes his own PC when it goes wrong using various specialist software utilities such as Norton and Xtree, and will talk about when it is better to use DOS rather than Windows.

A second expert user C1 talked about always configuring new software to his personal style: '.. so it's mine. In-coming e-mail is a gorgeous red.' He clears his e-mail regularly both either in the office or at home if he has been away from the former. Like E2 he uses a wide range of software including an in-house sales MIS, spreadsheets, word processing, graphics, journey planning software, the Internet, and CD-ROMs, albeit the last two are mostly used for social tasks.

On a daily basis he looks at how the business is performing. He tries to stay at a weekly level, but sometimes goes down to daily, although he no longer does his own spreadsheets, but has one or two which he puts information into which provide him with his 'little fads ratios'. He takes the data straight from one of the mainframe systems. '... there is no creativity, it's all monitoring and looking; more and more we are going for exception reporting, more and more I am looking for flags.'

He too produces all his own short memos. Longer, bigger reports he passes to his secretary and tells her where to find the information, eg., at board presentations. Like E2, he does all his own presentations without exception, internal and external, from board level to secretaries, and can produce full colour to black and white graphics. He too feels presentations are 'very personal'. Sometimes he sketches (using graphics software) what he thinks the next marketing campaign should be 'I'm forever getting on our marketing department's nerves, (but) they have a much better doodle than if I had done it by hand'.

When it comes to support the experts are usually totally self-sufficient and sometimes even provide support for others, as illustrated by the following quotes.

'(I am) the local support desk ...' Executive B1

'I'm used to looking after myself on these things. ... Occasionally I will ask someone I know who uses the programme ... I will rarely use the official help desk, because I've usually got beyond what they can answer. ... These machines are not very difficult these days; they used to be a lot more difficult, but now they are amazingly forgiving compared to how they used to be. It's a doddle compared to how it used to be, when every programme did it its own way and so on.'

Executive L4

Like the advanced users, these expert users talked about seeing and borrowing ideas (as per D10) and 'knowing beyond', and nearly always spoke about the PC being fun to use.

'I am always **thrilled** at how bloody fast they (PCs) work. It thrilled me with that little Sinclair and it thrills me even more now the sheer speed of what it can actually do...'

Executive C1

'... they're quite **fun**, and I quite **like** it. ... I just like them ... it is the area where I do my thing if you see what I mean. It's partly that, but I think with me it's also something to do with liking and appreciating the technology. I mean I've always thought it slightly **magic**. These things are so **clever** and I can't help as I use it to think, how does it do that? ... It's something to do with the sense of power that the thing has, that in that little box is that enormous capacity and the fact that somehow or other it becomes an extension of your own brain. It's a way of making you more intelligent almost ... You can harness this enormous calculating power. This uncanny memory which I don't have. '

Executive L4

'All this technology brings such **fantastic opportunities** either to be more efficient or just to have **fun**.'

Executive P1

Some of the experts, including E2, F5 and L4, had built their own computers. In the interviews the more experienced users (end-user IIs and experts), perhaps not unexpectedly came across so much more positively and were so much more excited about their use of the PC. For the more experienced user, using the PC was 'intuitive' and they found it hard to understand why others found the PC so difficult. Some were even scornful of the need for training.

'My answer to that (people saying they can't use Excel or whatever, or don't have a computer), I'm afraid is a little brutal: if they are in charge of money, the budget accountability, they are a failure if they can't work around a basic spreadsheet. It's just arrant nonsense for somebody to say "I'm manager of ten million project spend, and I've got a rubber and a pencil, and a trusty calculator." That's not the real world either. ... If you're in charge of £10, 15, 25 million you ought not to be unleashed on that sum of money, that degree of control, if you can't work in reasonably modern fashion.'

Executive M1

Their predilection was to explore how the PC can be exploited to its fullest and this may also reflect these executives' personalities as a whole; six of the ten expert users had an NT or NF core; two were STs and in two case the MBTI was unknown.

6.5.5 Discussion of the End-User Groupings

Initially it was thought that frequency of use and breadth (range) of software might give some indication of user type, a novice user only making occasional use of their computer in contrast to the expert-user who would be expected to use it daily. With the proliferation of e-mail, frequency of use must be looked at in terms of how frequently they use their PC for applications other than e-mail, possibly what tasks and they use their e-mail for. Range of packages on its own is not a detailed enough description, especially where one of those packages is e-mail. Some users may use several packages but at only a superficial level, as illustrated by D1's comments, whilst others may use just a few packages and be quite expert at them.

6.5.5.1 Executive End-User Cube

Cotterman and Kumar (1989) developed an end-user cube as described in Section 2.2.1 which described users in terms of their control over the MIS resource, involvement in the development of applications and operation of a system. From the analysis of the data on frequency, range (breadth) of software and depth of use a user cube as shown in Figure 6.8 is proposed. At the far extreme, each group of users corresponds to one of the nodes as shown in Table 6.8.

Clearly most activity takes place on plane B, and users can be placed at points along the various axes. For example, F1, who makes multiple applications of his e-mail, could be characterised as operating along the line 1,0,0 - 1,1,0, that is somewhere between being an absolute novice and a true end-user I. M1 is probably operating somewhere between an end-user II (1,0,1) and the true expert at (1,1,1), whereas D1 is somewhere along the (1,1,0) - (1,0,1) line, in that, as he says, he is only using a small percentage of the functionality of the software he uses. Although he uses spreadsheets quite extensively and will produce presentation material from them, at the time of the interview he was just starting to explore the use of graphics packages. Nonetheless, the cube provides a model initially to categorise users in terms of their expertise (depth and breadth of software used) and frequency of use.

Figure 6.8 Executive End-User Cube

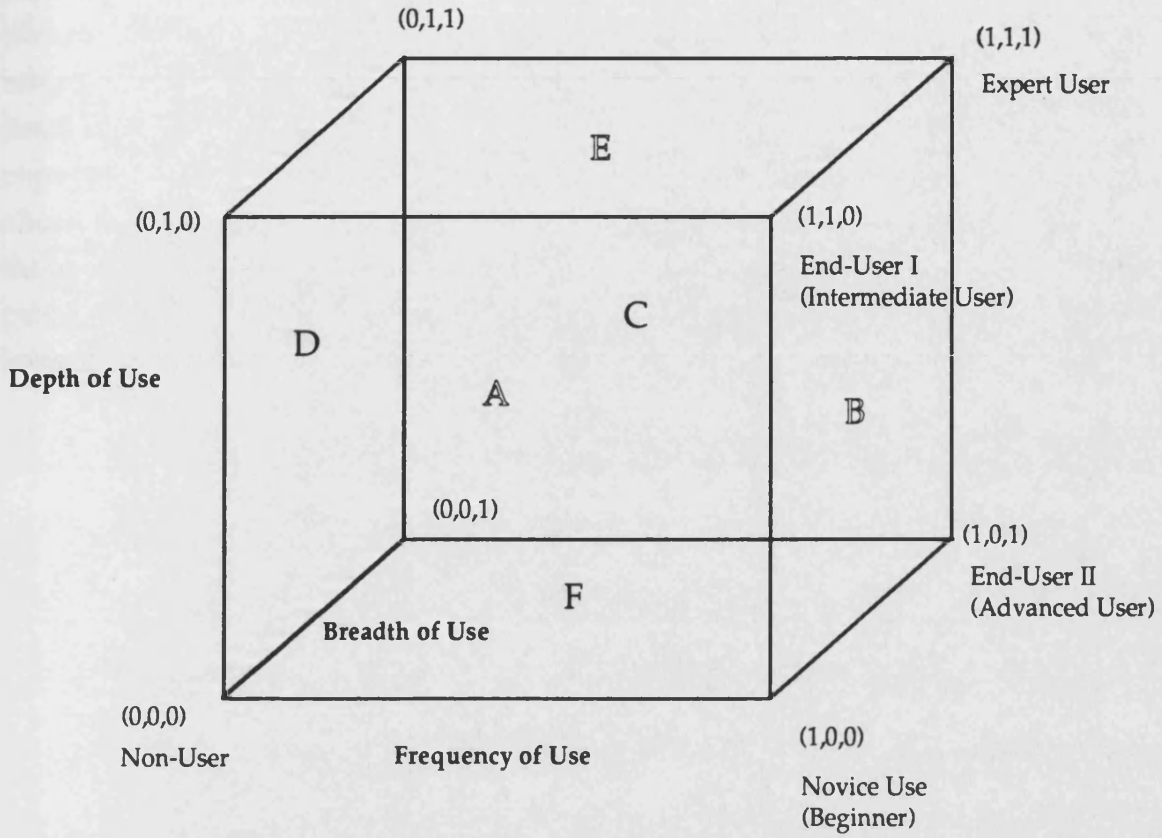


Table 6.8 Position of End-Users on the Executive End-User Cube

User Type	Node (x, y, z)	Typical Examples
Non-User	0,0,0	F6, C5, E3
Novice	1,0,0	A2
End-User I	1,1,0	F3, B5, J4, D1
End-User II	1,0,1	K1, D10
Expert	1,1,1	C1, E2

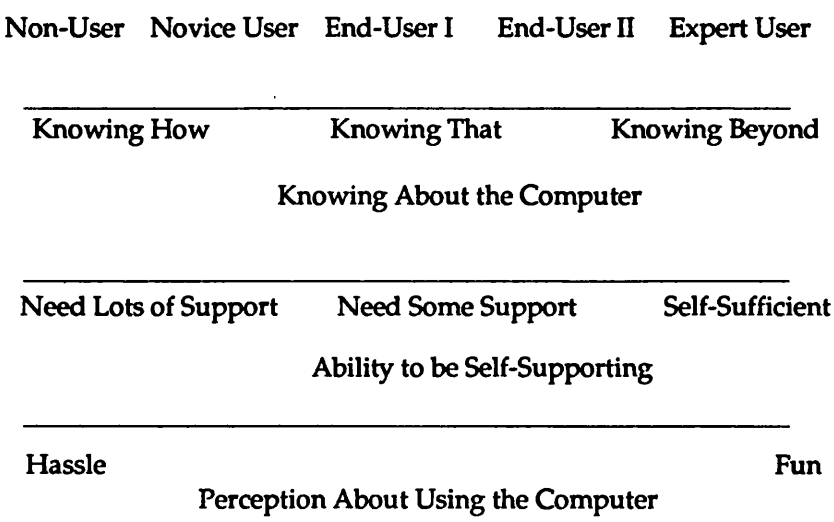
6.5.5.2 Other Characteristics of User Expertise

The interviews also suggest several other softer, less tangible characteristics which are associated with the different levels of expertise, of which three in particular re-occurred during these interviews namely, intrinsic motivation in the form of fun, a form of 'knowing' based on the work of Herriot and Pemberton (1995), and the 'ability to support' themselves, as shown in Figure 6.9.

The characteristic of level of support has been noted before by others (for example, Amoroso, 1992; Lee, 1986; Rainer and Harrison, 1993; Rockart and

Flannery, 1983). Igbaria *et al.*, (1995a) used a series of scales to measure intrinsic motivation which included fun/frustrating, pleasant/unpleasant, pleasurable/painful, and exciting/dull. The word 'fun' as used here is a category which encompasses words such as fun, joy, exciting, pleasure, and thrilled as used by the more advanced interviewees. At the other extreme some, the less experienced users (such as B5), and perhaps unsurprisingly, actually talked about the 'hassle' of using the PC. Indeed as the extracts from A2 and F7 show, there was an intonation that they clearly did find using computers fun. During other interviews an almost neutral attitude was conveyed, one which neither indicated a sense of fun nor hassle.

Figure 6.9 Other Characteristics of Executive End-Users



In terms of 'knowing' the more experienced users gave the impression of being more likely to be operating in 'knowing beyond' mode, whereas the less experienced users (novices and end-user Is) were more likely to be in a state of 'knowing how' and 'knowing that'.

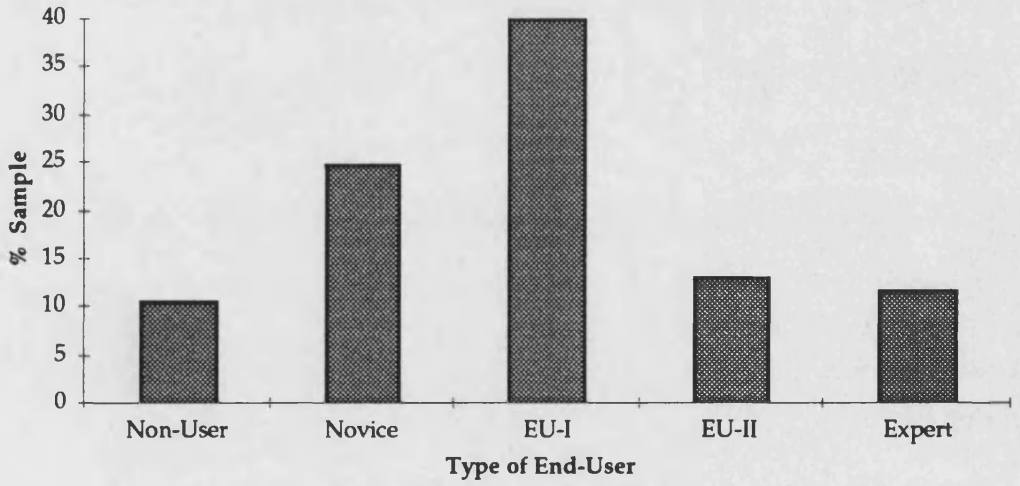
These extracts lend support to a broad end-user framework of four groups of users, namely the novice user (the beginner), end-user I (the intermediate user), end-user II (the advanced user) and the expert user (almost a guru). These groupings are based on the end-user framework developed by Rainer and Harrison (1993) which had previously only been applied to a group of users from one North American university. This study shows that their framework can be used broadly to describe other groups of workers in other businesses, and in particular senior executives from large organisations, with the following two main modifications.

First, in the case of the novice-user their use should include interactively handling their own e-mail at least in terms of producing short replies. Second, Rainer and Harrison (1993) have a fifth level of user called 'the infrastructure end-user' who is an MIS professional and whose job is to maintain the department's MIS infrastructure. Not surprisingly there was no evidence of any executive with such a role. Clearly, within each end-user group there are shades of grey, as shown by these extracts. Nonetheless, the executive end-user cube and the characteristic scales provide a way of taking account of these less quantifiable softer aspect of use. The distribution of the sample in terms of these broad end-user categories is in Table 6.9 and Figure 6.10. (This reflects the final category assigned to each executive in the light of the interview transcription and total data analysis.)

Table 6.9 Distribution of User Types

End-User Type	Number	% Total Sample
Non-User	9	10.59
Novice	21	24.71
End-User I	34	40.00
End- User II	11	12.94
Expert	10	11.76
Total	85	100

Figure 6.10 Distribution of End-User Types



The next section explores how these executives acquired their PC skills, how their use of the PC has changed over time and the causes of these changes.

6.6 Becoming an End-User

Executives were asked to describe how they had acquired their expertise with the computer and in particular the PC. Some found it hard, especially those who had been users for a long period of time. Nonetheless, with a little prompting most were able to recall the principal way they had acquired their expertise.

6.6.1 Methods of Learning

The following passages are typical of how most of the executives in this study acquired their expertise with the computer.

> '... the great advantage is I've still got the software at home, so if I want to play about with something, I can play about with it at home and I don't feel that I'm working, and I don't feel that I'm taking time from my work when I should be doing something instead of playing with the computer. You learn a lot by playing around with the computer.'
>
> Executive L3

> Prior to his PC arriving, N3 spent 'an hour a week with the guy who looked after computers ... to play with the graphics package. .. so I was sneakily familiarising myself with a computer.' ... He then had a two hour session with a trainer. '... In your spare time you just play with it really. I just thought of it as a bit of an adventure.'
>
> Executive N3

> '(I) suddenly discovered things like WordPerfect ...' She had been asked to write a book so '... it was an absolute god-send. ... (I) became very proficient at word processing and got very fond of WordPerfect, played a round with one or two of the other packages, but really I'm a very impatient person and if I can't do something very quickly and easily, I won't keep trying.'
>
> Executive K1

N3 is just learning to use the PC and K1 is quite experienced (an end-user II). Both are ENTJs and these dialogues reflect aspects of their personality. ENTJs enjoy a variety of learning methods, like a challenge and enjoy meeting that challenge. In both cases there are elements of that reflected in how they taught themselves. By virtue of the visionary NT core ENTJs will constantly be looking for the most effective way to accomplish a task and can get impatient, which is in keeping with K1's comments (Hirsh and Kummerow, 1989).

J5, an MIS director, uses a range of applications, not in as much depth as he used to, and said:

> 'I can learn playing with it (software) but I can't learn reading about it. ... Never been able to learn like that. Unless I can see it and practise it and say what does that mean, okay, right, now I understand, and write it down. Once I've written it down I'm okay.'
>
> Executive J5

J5 is an ISTJ. They are hands-on people (by dint of their core ST) and have a preference for learning by applying themselves to a task, and concrete useful information (Hirsh and Kummerow, 1989), and there are elements of this in J5's comments. Many others too spoke of playing and learning by trial and error rather than using either a book or more formal method such as a training course.

Some like C2 had attended in-house courses where the tutor had prepared some 'idiots' guides' which he found particularly useful:

> 'I think having somebody of her style and personality who was taking the manual and pulling out the key fifty points in the manual, and sticking them down on a piece of paper, an idiot's guide if you like. Having that I think at the start is the biggest single thing that made me more interested because it was easy. You didn't have to wade through the manual for hundreds of pages to find what you were looking for. And you could usually find enough in those documents to let you get on with what you were doing.'

> 'She was particularly good, she did it in such a way that it was understandable, as opposed to gobbledygook. ... I think there's always a danger with experts that they become so technical and so wrapped up in the technicalities, that they're useless at imparting information. They don't release it in a way that people can understand it. And I think that's paramount with this, because you can get as technical as you want ... and you're in danger of switching people off completely or making people frightened and saying Oh no I don't want that. So I think the simplistic view is the most productive.'
>
> Executive C2

The core NT of C2's MBTI would make the simplistic big picture approach appealing. Moreover, whilst NTs do not like highly structured learning situations, they readily accept coaching from someone they respect (Hirsh and Kummerow, 1989), and this came up several times, as indicated by the previous quotes from N3 and encapsulated by this one from G4.

'If I wanted to learn to do something I would get a professional to teach me, particularly for something like software ... because I take visual data in very quickly, I take in words very quickly.'

Executive G4

Sixty four executives cited some form of 'self-teaching' as the primary method by which they learnt to use the computer. Self-teaching is taken to encompass the 'trial and error' learning exemplified by the quotes from L3, N3 and J5, and the use of tutorials which come with the applications and which several said they used as exemplified by this quote from D1.

'I think the software is extremely user friendly nowadays, with help, pull down help menus and good reference books. It's fairly easy to go through on a self-taught trial and error basis if you want to learn more.'

Executive D1

An associated and recurrent theme about being self-taught was that of learning at home rather than in the office, mostly because they felt they didn't have the time to spend in the office as touched on in the extract from L3, although some executive, such as C1, said quite forthrightly:

'... when I'm at home I'm with my wife and family; if the software is needed for the company, well the company have got to pay me to learn how to use in their time.'

Executive C1

Of those who were primarily self-taught, half (32) said they could remember going on a course at some stage as indicated in some of the above quotes, but this was not seen as the primary learning mode. The most popular courses being on spreadsheets and general computer awareness, as shown in Table 6.10.

Table 6.10 Formal Training Courses Attended

Type of course	Number of Citations
General Computer Awareness (including basic PC skills, and composite PC packages like Microsoft Office which includes spreadsheets and word processing)	13
Spreadsheets	14
Others - (including word processing, graphics, database tools)	4
E-mail (in-house systems)	3

Seven executives cited formal training as their main source of learning. In about four cases this reflected the organisational culture. For example, G5 spent the first 18 months with one employer in training - both on-the-job and extensive classroom training as that was the 'ABC culture'. For some, learning to use a PC, and in particular spreadsheets, was part of a management course. In a few cases formal training was mandatory. For example, H6 had picked up some PC skills by himself but had attended a 'mandatory (awareness) course' as it was 'part of their ISO 9001 consultancy standards'.

In several cases those who had attended formal courses felt the courses were not very helpful for a number of reasons which included:

- too much technical jargon, as indicated in the earlier quote from C2;
- information overload, as indicated in the extract from C2:
- dealing with 'artificial problems' (F2) rather than real ones;
- coming after the executive had already taught himself, as per the quote by H6.

In other cases there was clear mismatch between the executives and how they prefer to learn and the trainer, as summed up by this quote from G3.

> 'There is also an issue around how people like me learn, which is not terribly easily. Take me with riding. I'd love to be able to learn to ride, but the prospect of going to a riding school and having some spotty sixteen year old explain to me how I ride without understanding what it is that I need to learn, understanding how I learn, fills me with horror. ... I have had a few unfortunate experiences where someone just tells me what to do by rote because they've been taught that way. They are not able to explain to me the logic about why something is being. I learn by understanding, or trying to understand why things are done in a particular way, not what one has to do. So people often don't tune into the way that senior people learn.
>
> I think there is also an attitude thing, that I'm arrogant, and I resist being taught because I expect to be telling people. And so there is an in-built resistance. I prefer to do the talking than do the asking, as I'm demonstrating here. And that's a classic for senior people. They are also resistant to being taught to do some thing completely new, in the sense that we are starting at such basics, it makes the problem of learning even worse. If I'm being taught to do something that's very very basic, I feel uncomfortable about being taught. Now that's because I would expect to know by virtue of the fact that I'm a senior guy and I'm forty seven years old, and all those sorts of things. I suspect a lot of my colleagues are the same.'
>
> Executive G3

Not only is G3 being very frank about himself in terms of being arrogant, but he encapsulates much of what others said about the problems with formal IT training. There is significant evidence to suggest that executives prefer to learn by doing first then analysing their actions, rather than being told what to do (for example, Argyris, 1991; Argyris and Schon, 1980; Kolb, 1976; Weick, 1983), and clearly the telling and didactic approach G3 talks about here is the antithesis of what executives find useful.

One expert user E2 said that he had found the course he attended on a database application was 'the most pathetic course I've ever been on in my life.'

In ten instances the executives talked of having one-to-one coaching:

> 'We had a lovely lady who had two or three great trainers, and I haven't spent enough time doing it (using the pc).'
>
> Executive Q4

> '... Mary does everything. Without Mary our lives would be a misery. Mary is a girl who used to work for us, left and came back. She buzzes around the building. She is a sort of flesh and blood help desk.'
>
> Executive M2

Interestingly, of the ten who have had only personal coaching, seven are novice users, two are non-users (having tried but effectively given up) and one is an intermediate user (end-user I). The intermediate user (M7) had in fact started to teach himself for domestic purposes (doing the accounts of a society for which he was treasurer) and the one-to-one coaching was primarily about how to use the office e-mail system.

6.6.2 Other Sources of Help

Not surprisingly, time did not always permit this researcher to cover all the areas identified in the interview guide, and asking executives who and where they turned to for help was an area which was not always probed. Where the information was available, the most frequently cited sources as the first point of call for help were secretaries (at least 15 citations), especially with word processing, and colleagues (at least 12 citations), as illustrated by the following comment.

'For the sort of work I do I can nearly always get help in this building if it's on word processing a secretary can normally help me or any number of people. If it's on a database, I would normally bung it to one or two people ...'

Executive P1

'... I've usually been in roles where my secretaries have been far more expert in all the systems than I have, so they've gone to the courses. ... Typically I go first to on-line help and then to my secretary ... I viewed that as a very important role of my secretary.'

Executive M5

Several users felt the on-line help facilities had improved (as indicated in D1's comments) and at least five specifically used this as their first port of call.

'The presentation has what I can only describe as the superlative help system. I mean it has never ever failed me. ... It's quite staggering when you think, well, how do I put a shadow round that box, 'cause it says in the book, you can do a shadow. So you look up S and there it is. It's always there. It's brilliant.'

Executive L5

About a further fifteen users cited on-line help as a secondary source and especially when they were on their own. For most, however, regardless of their expertise, turning either to the manual or an MIS professional was usually the last resort and filled them with despair, as indicated by the following quotes.

'I'm the world's worst at using manuals, be it PCs, or cookers. I'm just not the world's most patient individual and to look through these wretched documents which always seem so obtusely written that you have to spend about fifteen minutes looking for the relevant pages, that's not my idea of fun.'

Executive P2

'... if I've got to go to a manual, normally my heart sinks.' Executive G4

Moreover, as one executive aptly said of reference manuals:

'If you're mobile the reference manual isn't a serious option ... so I tend to go for the on-line help which is variously good and bad.'

Executive P3

However, a very few executives such as B3, (an ISTJ) who had been quite an expert user at one time, commented that the manuals were 'very easy for me to use'. As shown, a high percentage of the executives in this study were visionaries (NTs) and undoubtedly visionaries, with their preference for the big picture and dislike of too much detail, might find reference manuals hard to use. There is probably no disputing that the manuals are hard regardless of one's MBTI profile and level of expertise. Even an executive like M1, an experienced user, who has a strong ST core, felt that 'although they take quite a bit of working through, by and large I can get a steer ...' but his primary source of help would be the one or two colleagues he knows can help him, as indicated earlier. Similarly, as with on-line help, several executives cited manuals as a secondary source of support.

As for MIS support personnel, few quoted them as their primary source of help because in many cases, as intimated in earlier quotes, they were viewed in essence as unhelpful, and often made the executive feel intimidated, as summed up in these quotes.

> '... if I don't know how to do something with a particular piece of software and a colleague doesn't know it's not likely the IT department will know either.' (Although he does use them for hardware and network problems.)
>
> Executive B3

> 'Fiddling around at the back was great fun (for them - MIS) and they couldn't really see that fiddling around with the kit was not great fun for me. It didn't turn me on. ... For me it's something that - I switch it on and it needs to work. ... So that's not been a good experience. ... That's the other thing I hate, when they (MIS) give you that despairing look, as though you really are absolutely stupid. ... If one of the ways in which people learn is by asking questions and making enquiry, then they (MIS) do not encourage enquiry and asking questions. Their personal demeanour is, people who ask too many questions are at the end of the day, they are prats. So the more questions they (the users) ask is a measure of their stupidity.'
>
> Executive G4

These two quotes emphasise the three main reasons why most executives did not hold MIS in high esteem. First, there is the high level of jargon with which most executives not surprisingly are still unfamiliar despite the rhetoric of those such as Keen (1991). Second, there is the issue of not wanting to be made to look a fool. Third, there is the issue that many MIS departments are still entrenched in the mainframe techniques and lack significant PC expertise (PA Consulting,

1993) and are hence lagging behind their end-users, as seen in the above quote by B3. At least twenty two executives (including users and non-users) saw the MIS professional as a significant barrier to their ability to exploit the potential of the PC.

6.6.3 Summary and Discussion of Methods of Learning and Support

Many studies have highlighted the need to provide end-user training as a high priority and one which can affect the use they make of the PC (as discussed in Section 2.3.1.2.). Yet despite much research in to how to design effective end-user training, this study reveals that by and large most executives teach themselves. Several reasons have been posited for this finding. The main one may be the mismatch between senior executives' preferred methods of learning and the more procedural methods often adopted for MIS training. Grindley (1992, p. 59) surveyed 40 IT directors from the Times top 500 companies and found that IT training received a mixed reception, and was generally seen as simply 'unhelpful'. The findings of this study taken from the executives' viewpoint complement these IT directors' comments.

Of note is the importance these executives placed on the time to 'play' with their PC (as in 'dabble' and learn by 'trial and error'). Webster and Martocchio (1992) found that perceived playfulness was related positively to training outcomes. Davis and Bostrom (1994), found that intrinsic motivation in the form of hands-on use of the computer which was seen as enjoyable and fun also improved the learning outcomes.

The role of intrinsic motivation have been touched upon in Section 6.5.5.2. Whilst training effectiveness was not directly assessed in this study, the result of this study would seem to lend support to the role of playing with the computer as a part of the learning cycle even for senior executives. This reflects first, executives' preferred learning cycle of doing, thinking and absorbing their newly acquired skills in to their existing *modus operandi* rather than the new skills being seen as a discrete adjunct to how they work (Argyris, 1991; Argyris and Schon, 1980; Kolb, 1976; Weick, 1983). Second, it is in keeping with the needs of those with an MBTI visionary core of NT, who are typically inquisitive and relentless learners (Hirsh and Kummerow, 1989). The NT core is often prevalent amongst senior executives (Gardner and Martinko, 1996) and represented half this sample.

With regard to sources of on-going help, the preferred primary method was either a colleague or secretary. Whilst a few cited the manual, on-line help and an MIS professional, these were mostly used as secondary sources. These findings may reflect a number of broad interlined issues. First, senior executives are known to prefer verbal methods of communication (Kotter, 1982; Mintzberg, 1973; Stewart, 1967). Second, a high percentage of the executives had a visionary core MBTI profile which suggests a preference for more holistic approaches rather than procedural ones, and a desire for just the information they need to do the task in hand. Even those with an ST core, such as D1, will have an overriding concern to get the job when it is part of an overall ESTJ profile.

There may be some evidence that certain core types are more suited to one form or another. For example, one might expect that the STs by dint of the logical approach, would find the manual easier than the NTs. Davis and Davis (1990) in a study of learning outcomes on first year undergraduates on MIS courses, found a relationship between the cognitive style and training methods. However, there was no direct evidence of this and indeed it was not sought. Rather, the interest at this stage was in the how and why.

As far as on-line help is concerned, it would not be unfair to say that it is only very recently (within, say, the last two years) that the software suppliers have provided more useful and comprehensive on-line help as witnessed by the comments of D1 and L5. So the low usage as a primary medium may reflect previously unhelpful help facilities, and as indicated it was often used as a secondary source.

The MIS professional has come in for criticism before (see for example, Grindley, 1991; 1992; Rainer and Carr, 1992), and whilst there has been much rhetoric about the need for them to understand their executives' business needs (see for example, Grindley, 1991; 1992; Earl and Skyrme, 1992; Feeny *et al.*, 1992) one is left wondering to what extent this is happening in reality. Clearly, too, as illustrated by the quote from G3, there is a personality issue. First, some senior executives are not used to being told what to do by junior members of their team. Second, regardless of status, there is the linked element of not liking to look a fool, as illustrated by the quote from G4. Nonetheless, the results from this study support Boyle's (1995) finding of a continuing rift between the MIS professional and end-user manager.

6.6.4 Climbing the Learning Curve

Learning a new skill always involves some form of learning curve (Annett, 1991) and the PC is no exception, and as M8 said '... senior execs don't have any short cuts either...' Some, and especially the novice users, just found it downright hard, as indicated by the earlier quotes in Section 6.5.1. Others spoke about learning to use the PC as 'intuitive', often because they felt they had either some kind of logical mind or other skills which made it easy as illustrated by these three quotes.

> D8 was a systems analyst and said 'I would find it difficult to have someone teach me PC skills. ... the PC, especially in a Windows environment, to me is a very intuitive approach. '
>
> Executive D8

> 'I mainly picked it up on the job (using the computer). I was historically analytical; I guess that helps. I've always been mathematical so I don't get phased by numbers and relationships ...'
>
> Executive P1

> 'The thing that made it easy is I took up typing in high school. I'm absolutely convinced that makes such a difference. When I use (the computer) to draft a talk, it's not an effort to type. I find it easier to create something typing it than I do writing it.'
>
> Executive M5

In university and at business school M5 gained some computer experience, and when he joined his previous organisation there was an e-mail system '... by current standards it was a relatively old technology ... but it was used a lot and so I just started using it because it was there and other people used it and it worked.' He used spreadsheets and the word processors and didn't '... find them hard to work with.' M5 thought he had attended some courses but by and large had taught himself with help from his secretary, as indicated by a previous quote.

Some who felt learning to use a PC was intuitive, found it difficult to see why others should find it hard. Whilst some acknowledged that not everyone can learn by themselves there was still an element of scepticism about the need for training.

'... the software that's coming out now, I mean frankly when Microsoft say on television you're grandmother can use it in ten minutes, it's probably true. It isn't difficult to start to use some of this kit nowadays to be honest.'

Executive H5

'I don't like formal tuition in these sorts of things. I know it's not right for everyone, but I do believe that if you give someone a grounding and then let them experiment, (a) the experiment is a test to see whether or not they are willing to, if you like, contribute some of their own energy in to it, rather than saying "train me!" And (b) I think if they do that they become more captured by the technology and what they can do, and more questioning, and play more of a part in their own development process...'

Executive M4

These four executives (D8, H5, M4 and M5) all have visionary (NT) cores and this sense of the PC being intuitive to use is what one might expect. In H5 and M4 one might also be seeing elements of their whole MBTI (ENTJ) profiles, as reflected by the acronym for an ENTJ, namely Executives Need Tough Jobs.

Whilst it might have been intuitive, as the earlier quote from P1 indicated, it was not necessarily an easy learning curve even for the experts like E2 and P1.

'When they first come to use it (the PC), it takes longer than the way they used to do it. Well everything does. But instead of saying, well, presumably that's because I've got to get proficient with it and go up the learning curve, they then throw it away and say, I can do that quicker on the back of a fag packet. Of course they can do the first version, but when somebody comes back a week later and says, by the way, the board would like to change (items), the clever guy (who) spent longer at the beginning putting it on to Excel, puts in five numbers presses a button and he's done it in one minute. The guy who at the beginning wasn't prepared to invest that time, needs another two days. ... I think that's another lesson I learned: be prepared, as I am often, to be inefficient to start with, because it does lead to efficiency in the longer term.'

Executive P1

' ... a tremendously steep learning curve at the start and (you) end up putting in a lot of time to get to a reasonable competence with something. ... So I think you end up with a sort of very very hard period and then it sort of settles down.'

Executive E2

Some, such as G4, as implied in an earlier quote in Section 6.5.3, talked about how '.. the learning process for me has been a gradual accumulation of skill and confidence'. Others had, for various reasons, been through several learning cycles.

> 'I have, I won't say mastered Lotus 123, but have been reasonably competent with it about four times in my life. Then I have no reason for using it for a long period of time, and suddenly I'm thrown back to using it again, and I really basically have to get out the old elementary work book that comes with the Lotus set, and, go through the various different examples in order to do that ...'
>
> Executive J1

Regardless of the ultimate level of expertise achieved there is some form of a learning curve to be climbed, be it a gradual gentle path, or steep and at times hard. For some it was intuitive, for others it was far from obvious and they needed lots of help on the way, and in some cases they have made the foray up the learning curve several times. As the quotes from P1 and E2 show, an investment in time is needed regardless of the shape of an executive's learning curve if they are to reap any rewards. As M8 puts is so succinctly:

> '... that's the other big trade off I think, how much you need to be able to do. You need to be able to do a few basic things, how much effort is involved in learning to do more complex things, then if they are not part of your day to day job the learning is just going to fall away ...'
>
> Executive M8

Having acquired a certain initial level of expertise there is then the question of how that expertise has changed over time.

6.7 Variations in Use of the Computer over Time

There is evidence, particularly with respect to mainframe DSS applications, that the use an executive makes of a computer changes over time (Martin 1986; 1988). A specific aspect of interest for this study was how executives' use of the computer and in particular the PC had changed since they first started using the computer as a personal productivity tool, and to try to identify the events and encounters which led to changes in the executives' use of the PC. As discussed in Chapter 4, Newman and Robey (1992) in their study of the user analyst relationship mapped events in order to identify the different paths and outcomes of the relationship. Using the data analysis procedures described in Chapter 4 to

analyse the 'Use Over Time' graphs, and Newman and Robey's (1992) techniques, this researcher identified four sets of patterns with respect to executives' level of end-user expertise (as defined earlier in Section 6.5). These are shown in Figure 6.11 and outlined below in Table 6.11.

Table 6.11 Changes in Executives' Use of the Computer over Time

Pattern	Description
Steady State User	A user who has reached a steady state of expertise, be it that of a novice- or an expert-user.
Declining User	An executive whose use expertise has declined in terms of the depth, breadth or both with respect to the applications he uses.
Born Again User	An executive whose expertise has declined, but who is re-developing his expertise.
Growing User	An executive who has recently started to use the computer and whose level of expertise has not yet plateaued and reached a steady state.

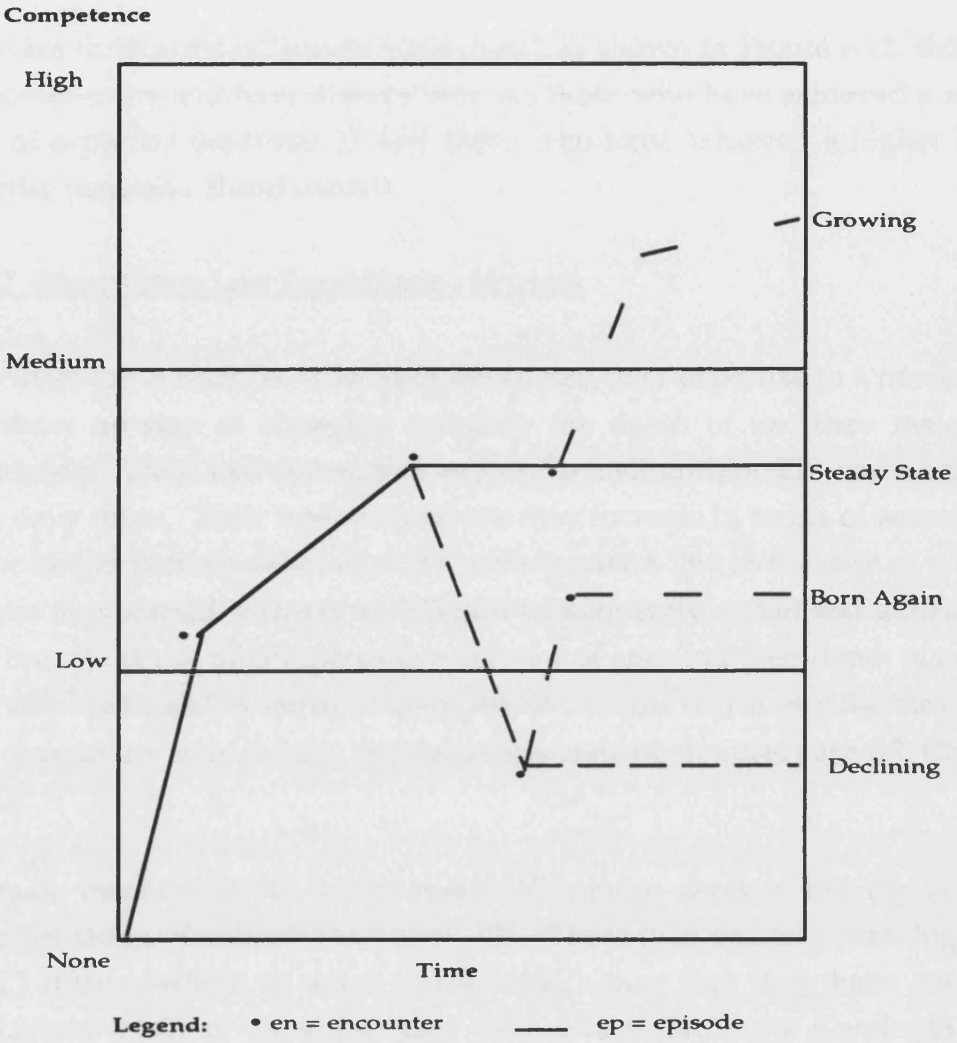
Newman and Robey (1992, p. 255) treated the antecedent conditions as the relationship which occurred between the analyst and the user before the systems development project was begun. In the context of their study these were regarded as 'episodes in progress at the start of the project'. Antecedents are, as they note, generally regarded as 'the outcomes of a whole history of prior projects, and will usually affect subsequent events' (p. 255). In rare cases when there is no significant historical relationship between the user and analyst each participant is likely to bring behaviours and attitudes from other previous experiences.

In this study the most obvious antecedents would be:

- age;
- previous experience with computers;
- gender;
- education - level and discipline;
- personality in the form of the MBTI profile where it is known.

The literature review revealed that sociodemographic factors have been found to influence users' disposition towards a computer, albeit the results have often been contradictory and equivocal as discussed in Chapter 2.

Figure 6.11 Executives' Patterns of Computer Usage



These four patterns of use are explored in detail in the ensuing sections, and where appropriate the above antecedents will be analysed. For the purpose of this discussion the four different groups of end-users have been re-grouped into three slightly broader groups as shown in Table 6.12.

Table 6.12 User Type and Overall Level of Computer Competence

User Type	Overall Level of Competence
Novice	Low
End-User I	Medium
End-User II and Expert	High

6.7.1 The Steady State Users

There are three sorts of 'steady state users', as shown in Figure 6.12: those who are novice-users and have always been so, those who have achieved a medium level of expertise (end-user I), and those who have achieved a higher level of expertise (end-user II and expert).

6.7.1.1 Steady State Low Level Users - Novices

First, there are executives who have developed their expertise to a novice status and show no sign of changing certainly the depth of use they make of an application. Their use relates primarily to e-mail and/or EIS and so they are often daily users. Their frequency of use may increase in terms of accessing the PC for longer periods either as more users come on-line in the case of e-mail, or because they started with say an EIS and subsequently e-mail was added. Thus their breadth of use might increase by a factor of one, but their depth of use stays relatively static, and in terms of their position on the end-user cube they remain very close to the node (1,0,0). Typical steady state novice users are A2, D3, E2, F1 and Q2.

The main episode (ep1C) which motivates novice users to use the PC is the implementation of either e-mail or an EIS. There then ensues a learning period (ep1C) during which at some point (en2C) they feel they have reached a satisfactory level of expertise and they effectively stop developing their competence. Thus they appear to have reached their equilibrium point and there ensues an episode (ep2C) in which their level of expertise remains static. Undoubtedly, there may be incremental changes (eg., they may learn to use an additional e-mail feature), but their are no revolutionary changes (events) which lead to a significant change in their competence (eg., they learn to use a complete new package such as a spreadsheet).

However, the implementation of e-mail is not in itself always enough to make them use it. Indeed, a contrast would be two regional divisional directors whose roles are identical, but who are responsible for different geographic regions, one of whom adopts (F1) and one does not (F6). Their antecedents are identical except for the MBTI profiles as shown in Table 6.13.

Figure 6.12 Steady State Users

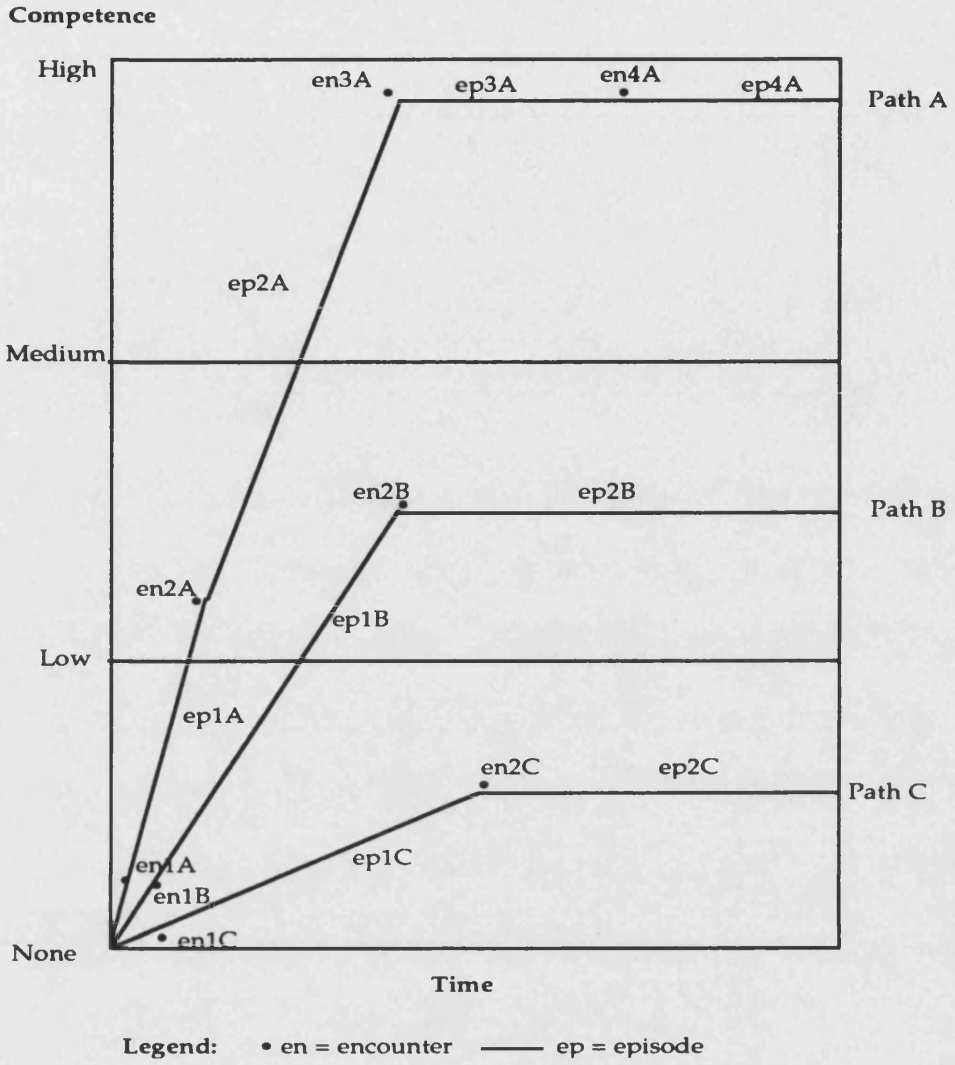


Table 6.13 Comparison of the Antecedents for a Non- and Novice User

Antecedent	F1	F6
Age	46-50	46-50
Gender	Male	Male
Education	BSc Engineering	BSc Engineering
Years with organisation	20+	20+
Prior PC experience	Some in previous roles	Some in previous roles
MBTI	ISTJ	INTP

F6 used to be responsible for the IT organisation's resource and F1 has now taken over that responsibility. F6 had used a PC at home to support his leisure activities.

'I had a lot of fun out of that ..., making it print out labels, in other words a bit of a drudgery job which a lot of people don't want to know about, you got fun out of (it) not necessarily efficiency, but fun out of getting the computer to do it in an efficient way. Overall it would probably have been easier to have written the labels by hand, but you got fun out of doing it.'

Executive F6

F1 as discussed earlier in Section 6.5.1 adopted e-mail and uses it almost every day. To some extent his motivation to use e-mail reflects certain strong personal beliefs he has about the phone.

'(Managers are) totally irresponsible with the telephone. It's very easy as a senior manager to pick the phone up and ring somebody. Because you are a senior director and you have rung them up they will put that at the top of their priority list, and you are arrogant enough to suggest that what you are asking them is important, without checking what they are doing. It is very rare that you need to ring somebody up. This has been a passion (of mine) for ten years.'

As the 'owner of MIS' he says:

'(It) makes me a champion of the concept as a computer illiterate and not as a computer user. ... I could not imagine that an office five years hence ... (in) the best organised companies it would be almost the *sine qua non* of a good company. They would be using electronic information and data and networking ... it would be routine.'

Executive F1

To him e-mail therefore not only supports his personal management philosophy, and supports his figurehead role in sending out a message about what is acceptable behaviour and the skills others should learn (Kanter, 1992). It also provides other benefits which are discussed in detail in Chapter 7. For F1 e-mail is an integral part of how he operates as a general manager. The NT in his INTP MBTI profile gives him a visionary attribute and may help him see beyond, as opposed to F6's ST traditionalist components. F1's NT core may mean he will be more inclined to try out new ideas even if there is not a clear-cut case for doing so (Hirsh and Kummerow, 1989). In contrast F6 is an ISTJ and will be inclined to be rigid and want clear proof of the benefits of using e-mail before making the commitment to use it, and indicated, his previous experience with a PC did not provide clear cut benefits.

Both have a preference for introversion (I) too, and as discussed in Section 3.17.3, one might expect the use of e-mail to appeal on this basis. So although on the face of it the two executives have similar roles, and antecedents, there are subtle underlying differences which make one adopt, and become, a steady state user and one remain a non-user. Thus the episode (ep1A) of the e-mail being implemented may not always be sufficient to encourage an executive to make the transition from non-user to user.

6.7.1.2 Steady State Medium Level Users - End-User I

Second, there are those who have reached a medium level of expertise such as end-user I status and again show no signs of changing breadth of use, as shown by path (B) in Figure 6.12. Typical examples would be executives B5, D1, F3, H5, L2, J1, J3 and N4. Again, their frequency of use may increase, and their depth of expertise might vary slightly (either up or down), but the overall breadth of applications they use generally remains, and so they remain close to the node (1,0,1). Thus, like the novice, after they reach a certain level of competence they just do more of the same using their knowledge of how and that, as illustrated by the earlier quotes from D1, F3 and the following quote from J3.

> 'Lotus has been acquired, very much patchwork really, because I got involved with Lotus very early on within the company. ... Since then because Lotus has clearly been upgraded a number of times, it's got many more features on it, I've been on the odd sort of half-day (internal) course which is intended to introduce the features of any new version. ... I tend to try and master the basics of the thing first and if I've got a particular application, I think I wonder if the machine does this. I'll go to the manual and see what it says in there and then try it out. So I think I tend to add various skills as (I) go along, and build it up.
>
> Executive J3

They may have been through various learning cycles (episodes (ep2B)) as indicated in J1's comment in Section 6.6.4, and this comment by J3. The encounters (en2B) which trigger these will be either a task for which they know the PC can help them or the arrival of a new version of the software. However, overall whilst the depth and frequency of use may vary slightly their overall PC expertise remains constant. Like the novice users they seem to be in an overall state of equilibrium with no obvious episodes and events likely to change their overall level of computer usage.

6.7.1.3 Steady State High Level Users - End-User II and Expert User

Third, there are those who have developed their competence to a very high level which equates with being either an end-user II or an expert (path A in Figure 6.12). In the case of the expert user, they never really stop developing their level of expertise in terms of the depth and breadth of applications they use. They are continually adding new layers of use, although given they have already reached a very high level of expertise we are looking at very small increments of growth as illustrated by the quotes from E2 and C1 in Section 6.5.4.

Typically the initial encounter (en1A) is a personal interest in the PC. The encounters (en2A) which have pushed them up the learning curve are then, typically, the emergence of new technology (hardware or software), a recognition of the potential of the PC and a desire to find more ways to use it. There may be several mini-encounters during the episode (ep2A) on the way up the learning curve, as shown by path (A) in Figure 6.12. Newman and Robey (1992) constructed their encounters from observations over time. In this study the executives were asked to recall from memory how their use had changed. Twelve (71%) of the high level users had been users for more than ten years; the advent of the Sinclair ZX81 generally represented their first encounter with a PC (en1A). Consequently most could only recall the major encounters such as the advent of Windows. It was therefore sometimes hard to achieve 'thick' descriptions. Converse and Presser (1994) note the problems of recalling events in reliable detail and suggest it can be safer and just as valid to ask the interviewee to recall major and salient features of the event. Nonetheless, path (A) in Figure 6.12 represents a typical overall growth path for a high level steady state expert user. Their depth and breadth of use typically increases over time as new technological developments emerge and the executives themselves see new ways to use the PC, as illustrated by this quote from M1 an end-user II.

> '.. the products are there, you've got to try them to see if they suit you. ... You've got to spend the money and see if it works, on these cheaper programmes, rather than go out and design tailor made, all whistles and bells systems just for you. ... if you get some benefits out of it and it doesn't cost too much, then you've made some progress. It's a useful way of taking you forward.'
>
> Executive M1

Executive (E4) had only been a user for the last three years and could recall the encounters more clearly. He had used a main frame on-line information system

between college and work, which represents the antecedent conditions. His first encounter (en1A) with the PC was using his wife's. The next major encounter (en2A) was getting his own PC, followed by a learning period (an episode ep2A), an encounter (en3A) in the form of changing jobs and a period (episode ep3A) when he explored just how the PC could help him run his business more effectively. There were then some mini-encounters (such as en4A) as he discovered even more ways the PC could help him.

E4 first used computers when on leaving college he wanted as much information as he could find on the company he was about to go to for an interview.

> 'That was the first I realised that there was a hell of a lot of information tucked away somewhere that was available. ... they were impressed with my knowledge ... it got me the job. ... I reckon, because it was a point of difference from anybody else that came in...'

This antecedent condition of prior use of a computer thus represents a very positive experience. As indicated, however, E4 had not used a PC as a management tool until he started to use his wife's Apple Macintosh at home (en1A).

> '... that's when I started to realise what it could actually do for me in terms of presentations, in terms of communicating with people, so it started from there (ep1A) ... Once I got my own machine (en2A) that's when it (use) sky rocketed (ep2A), that's when it became every second day. Because I needed to learn about it I needed to understand what it could do for me. ... I would have been up to daily by the time I left X. X was my steep learning curve.'

He then changed jobs and location within the company (en3A) and:

> '... my use increased dramatically even since I came back (en3A). ... but I would say how I'm using it is a lot more productive and efficient now ... I don't even know if I've learnt more on what it does, because I still don't know a lot about the programmes, but I've a lot more on my machine now.'

He went on to explain how he uses these in relation to how he works. At this stage although E4 has reached some sort of steady state denoted by ep3A, there have been several mini-encounters (en4A) such as the discovery of a commercially available CD-ROM database of organisations with whom he deals. This enabled him to extend further the use he makes of his PC. However, they

are not major encounters such as those at en1A and en2A which led to revolutionary changes in his level of competence. Orlikowski (1996) has recently suggested that change could be viewed as a continual process more akin to metamorphosis, and this might be what is happening to these more expert users during these episodes such as ep3A and ep4A.

Other typical encounters which have led experienced users to further develop their expertise, such as the need to accomplish a task quickly.

> 'I'll tell you the thing that actually set me off realising that I had to master this myself, the Secretary of State took it into his head he wanted to give a presentation to his colleagues, and so we did it for him ... and of course he then wanted some changes made, inevitably, and we had about an hour and a half to turn it round. Now I'd done it by getting someone else to do it and I'd had the sense to bring that other person with me and he made the changes. But some of those changes required thought, interpretation, and bits of policy this guy didn't know about. It would have been enormously quicker for me to do it by myself and of course I could have done it on screen in the meeting.'
>
> Executive L4

Like the steady state novice and end-users, these high level (end-user II and expert) users are now in an episode (ep4A) which represents an equilibrium position, the difference being that for them this relates to a very high level of expertise with the PC. In terms of the end-user cube they have remained at the far extremes of their respective nodes, namely (1, 0, 1) for the end-user II and (1,1,1) for the experts. Some end-user IIs are probably much nearer the expert node at a point such as (1, 0.75, 1).

The antecedent conditions of the nine expert users are summarised in Table 6.14. Seven have some form of innovative MBTI profile: six being visionaries (NT) and one a catalyst (NF). As discussed in Section 3.17.3 one might expect the visionary NTs to use a wider range of packages and to be exploring new ways to exploit the PC and be in 'knowing beyond' mode and there is some evidence to support this expectation.

For these steady state expert-users their use of the PC has in some ways become interwoven into their way of *modus operandi*, such that they could not conceive of letting their expertise fall off, indeed quite the opposite, as illustrated in the previous excerpts. As either new responsibilities and tasks come their way, or new technologies emerge they seek further ways to use the PC. They are continually building on their knowledge of how and that, to see beyond.

Table 6.14 Steady State Experts' Antecedents

Antecedent	B1	C1	E2	E4	F5
Age	41-50	41-50	41-50	<40	41-50
Gender	Male	Male	Male	Male	Male
Education	BSc Maths	HNC Chemistry	LRSC Chemistry	BSc Geology	BSc Engineering
Prior PC experience	Always been involved with intelligent devices	None prior to a ZX 81	None prior to a ZX 81	On-line database to research for job interview	None, built own PC at home
MBTI Profile	ENFP	ENTP	ENTP	INTJ	ESTJ

Antecedent	H6	L4	L5	P1	P3
Age	<40	41-50	41-50	41-50	<40
Gender	Male	Male	Male	Male	Male
Education	BA Material Science	BSc Maths	PhD Economics	BSc Economics	BSc Law
Prior PC experience	Used a PC at university	None, built own PC at home	Programmed at university	None	None
MBTI Profile	ESTJ	INTJ	ENTP	Not known	Not known

Note: Education represents the highest academic qualification obtained.

6.7.2 Declining Users

For twenty one executives their competence has declined, as shown by the set of patterns in Figure 6.13. The decline can vary from quite a shallow path where it is primarily the depth of use which has decreased, path (A), to those for whom it is quite a sharp decline, path (B) and (C), and there is a decrease in all three dimensions of the executive end-user cube. Some who were once users have become non-users, for example D2 and D9. The three most typical reasons for the initial interaction with a PC (en1) are exemplified by the following:

- peer pressure, eg., B3.
- a defined and specific task for which it is perceived the PC can help, eg., C3;
- use of the PC is a necessary part of the job, especially where their professional training was in finance, eg., D6;

'... there was management software there on PCs which could be of use, spreadsheets, graphics packages, and you start to hear what you could achieve and also it seems to be a tool that managers need. You start to see other managers getting one, so you immediately say "I'd like one of those" ... enthusiasm built up as others used it.'

Executive B3

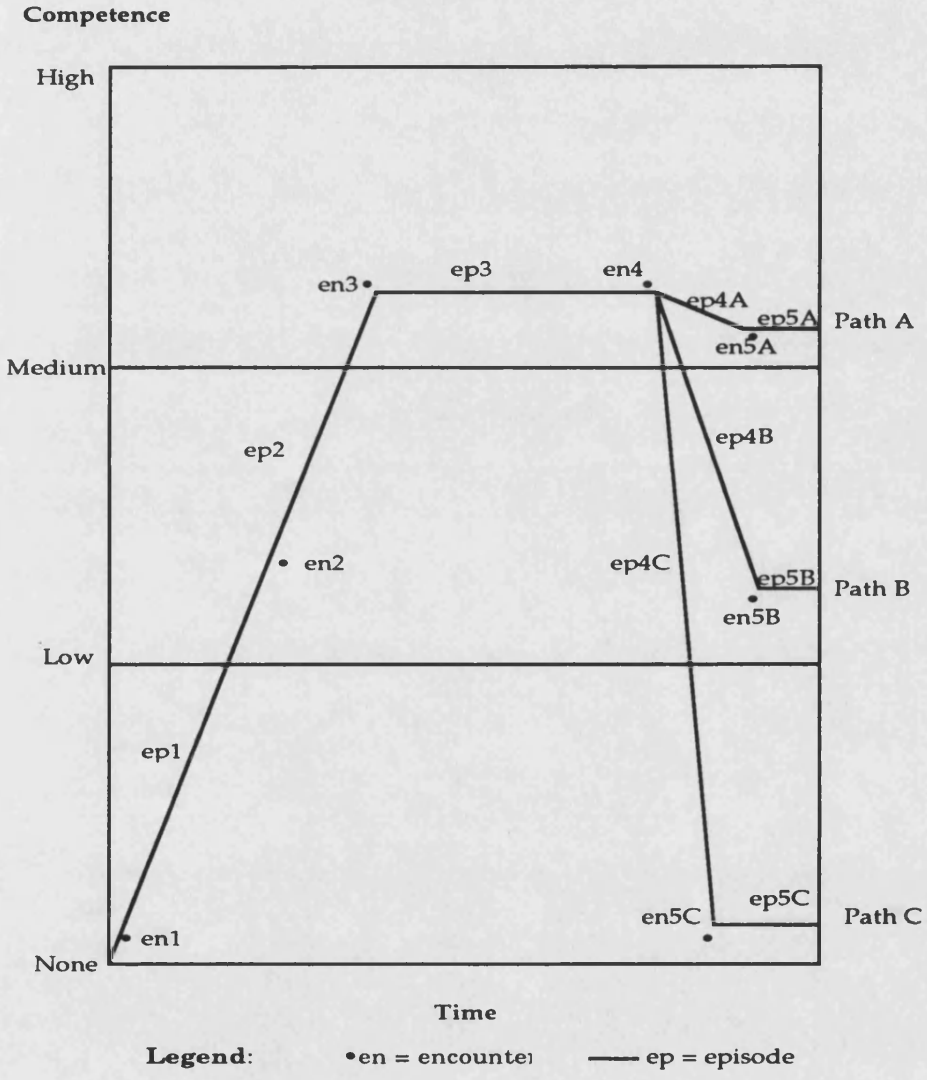
'I decided that modelling was the thing that needed to happen and was a way of collecting international information for consolidation purposes. So I taught myself.'

Executive C3

'I learnt Freelance because I had to prepare a presentation. I learnt dBase III because I was working as a consultant on a particular site, and we needed to put together a computer based control system, a PC based control system. So I had to learn it. ... I've learnt it because I've needed to rather than because I've particularly wanted to.'

Executive D6

Figure 6.13 Declining Users



One might surmise that the initial use of the PC was not completely discretionary as it appears in the case of the expert steady state users; rather it was enforced for the reasons indicated. Moreover, when these three started to use the PC they were probably middle rather than senior managers.

As with the steady state users, there then follow one or two major encounters (en2 & en3) and accompanying learning periods (ep1 & ep2) during which these users further develop their expertise. Such encounters, like those of the steady state users, were mainly:

- the evolution of new technology (eg., Windows);
- getting a PC of their own;
- a need to do tasks additional to that for which the PC was first used, as illustrated above by the quote from D6.

However, there the similarities end, because unlike the steady state user, after reaching a steady state, denoted episode (ep3), these users now experience an encounter (en4) which causes them to decrease their depth and breadth of use, even though, as indicated, in many cases their frequency of use either remains static or increases, the latter often being the case when there is e-mail.

C7 is a typical example of an executive who, although he still uses a PC daily, feels his overall frequency of use and breadth of use have decreased path (A).

> 'I use it less and less, but I guess the decision support that I do is actually more critical. ... it's becoming more and more important that I get things right in terms of relying on the PC, because I'm doing them on my own. Where I do modelling on my own it's where I'm taking a decision on my own.'

Whilst C7 will have specified structure of the model someone else will have developed it.

> 'So I guess the sort of modelling I do now, it's simpler and easier because by definition it's higher level. On the other hand it's really important and to that extent I often try and not place too much reliance on modelling unless I can counter check it with something else.'

He is responsible for MIS and has made it an organisational standard that everyone does their own word processing work unless it is something which is either difficult or big to organise, eg., a report or an external document which needs to go on letterhead and needs to be very well presented.

> '... my chance of not using a PC in the office is like zero.'
>
> Executive C7

In this case there is only a shallow decline, primarily in terms of the depth of use (ep4A), and he has moved on the end-user cube from a pure end-user II at (1, 0, 1) to, say, (1, 0.5, 1), and is somewhere between that of an end-user I and end-user II. Establishing a corporate policy whereby everyone produces their own short documents has acted as an encounter (en5A) which has arrested his decline in competence and he is now in an episode (ep5A) where his competence, whilst less than it was (during ep4A) is nonetheless still quite high compared to what it might be, if he had gone down path (B) or (C).

In some cases there can be a very steep decline, path (C), as illustrated by executives G3 and M9. G3 was an expert user, using his PC every day, but now he only uses it occasionally (may be once a month).

> 'In the routine day to day, or week to week, month to month hurly burly of life here I don't need to use (one). We've got good management information coming to us. There's very little I can add to that. ... But if I'm starting to think about the future, for example, where we are trying to work out the future of our industry and what we are going to have to do, that's when its useful to be able to do simple spreadsheets and play around with numbers a little, often without the embarrassment of going out to someone else and trying to explain something that I'm not really very clear about myself, because the thoughts are still evolving in my mind...'
>
> Executive G3

For G3, promotion was the encounter (en4) which led to episode (ep4B) which has been very steep, and his main use now is word processing and spreadsheets on an occasional basis. Similarly, M9 was at one time a high level user, producing his own spreadsheets, word processed documents, graphics, trend analysis and dealing with e-mail but he is now at the bottom of a long episode (ep4C) of declining use (resulting from a series of promotions) and is in an episode (en5C) of being a novice-user. The fact the organisation have implemented some MIS systems which he needs to use probably acted as the encounter (en5C) which stopped him becoming a non-user and left him in the current novice-user episode (ep5C).

> 'I found that as I move up the organisation (en4) I use my PC less and less (ep4C). Where as before in previous roles, you know, I've had my own personal spreadsheets, and the rest of it (presentation and word processing software). Now I have what's called a finance and IT account manager who is meeting my information needs. I'm largely taking decisions, usually jointly with the rest of the board, on information provided to us, as opposed to

doing a lot of the analysis that goes on behind the decision making. It's still essential for some of my information needs and some of the systems which are computerised (en5C) (eg., requisition authorisation), but its not a big part of the working day, and there will be days when I don't use it all.'

Executive M9

Initially several positive encounters, such as being able to continue working whilst recovering from an injury and producing some useful and successful applications, acted to motivate M9 to reach a high level of competence with the PC. In 1985 when he was planning the launch of a new product he broke his leg.

'I was at home and so basically I got my PC delivered and that was actually excellent, because I spent like a month just doing a model of the X market and forecasting the product. The model actually proved extremely accurate, so it (was) something I was quite proud of really. When we actually saw the up-take it followed it for about the first eighteen months pretty sort of spot on. So that really go me into it I guess.'

'... Then when I went out as a Regional Sales Manager, we were still then, we were getting sales data on a paper system, no means of graphing it or whatever. And suddenly I was going out as a Regional Manager and I could stick things in spreadsheets, I could graph them, again there were so many good applications for running a small sales team.'

'... You know I found it very exciting from a personal development point of view. I think at times a bit of a danger, I was a sort of zealot who ran the risk of looking for applications even when there weren't applications, you know trying to do everything... '

But now he admits:

'... I have regrets. In a way I would have liked to remain computer literate, and I feel I've fallen behind.'

Executive M9

Overall, the way the declining users' use has changed in terms of the tasks and software used is shown in Table 6.15. The main changes are related to the use of spreadsheets and presentation software as exemplified by C7 in earlier quotes. Whereas in the past these declining users would prepare all their own work, now they delegate to others. In some cases, as indicated, the executive will even stop interacting directly with e-mail, although this is rarer and usually reflects either an extraordinarily high work-load as in M9's case (as a result of a merger after

which he was promoted to the top job in the new company), or a personal perspective about e-mail as we see with G3 in the following quote.

Table 6.15 Changes in Competence as Use Declines

Type of software	Competence before decline	Competence after decline
Word processing	Often prepare own work	Occasionally prepare own work
Spreadsheets	Do more and would develop nearly all their own	Do fewer and often use ones developed by others
Graphics	Mostly prepare own	Others prepare them for them
Others, eg., database tools and project management	Would develop own application	Look at the results prepared by others
E-mail	Interact and deal directly with own e-mails	In some cases they continue to deal with them, but in others their secretaries deal with them

In a previous job G3 used e-mail because it was often easier to send an e-mail as he worked long hours. In his current job with a different organisation he no longer interacts directly with it. He doesn't miss e-mail as he feels there is not the urgency at organisation G which might dictate using e-mail. He also feels e-mail can be intrusive.

> '... you haven't got any option but to read it. ... it enables you to get something in front of someone's nose, (even) if they don't want anything to be got in front of their nose, and I'm resistant to that. ... I'm very busy, I work quite hard and just because someone else thinks something else is important doesn't mean that I do. The only way I can survive in this job without having a nervous breakdown is to have some screening. The screening has got to be effective against all the forms of intrusion. And that's why my secretary will get my electronic mail messages. (Otherwise) people will understand well I can always e-mail him, if I can't get past the secretary in any other way. And that would irritate me.'
>
> Executive G3

As discussed in Section 4.7.1, one of the major dilemmas analysing qualitative data is the need to reduce the data to a manageable level without losing either meaning or richness. In this context, Van de Ven and Poole (1990, p.319) suggest that 'it is important to differentiate between an incident (raw data) and an event (a theoretical construct) subsequently used to describe the incident'. To avoid this they suggest 'coding incidents on several event dimensions associated with the incident and arraying them on multiple tracks which correspond to conceptually meaningful categories' (p. 323).

The two most typical encounters (en4) which led to a decline in use were:

- job change within the organisation;
- move to another organisation.

Although, these core categories are useful for plotting changes with time, they generally comprise several dimensions, as shown in Table 6.16, each of which may come into play at different points during an episode, as illustrated in the next section. Some of these dimensions could be clearly identified as shown in the following discussion. However, it was not possible from this study to determine in precise detail either the sequence of these events relating to these dimensions or which dimensions were more dominant.

Table 6.16 Dimensions of Encounters Which Can Cause a Decline in PC Competence

Encounter Category	Dimensions
Job change with the organisation[1]	Role change Additional responsibilities Change in priorities People to whom tasks can be delegated Novelty of the PC wears off
Change of organisation[2]	Role change Additional responsibilities Change in priorities People to whom tasks can be delegated Different MIS Culture (eg., less adequate software and hardware, less adequate basic corporate MIS data, fewer users) Novelty of the PC wears off

Notes: 1. Job change may or may not be a promotion. 2. Change of organisation could be either internal to another business unit within the same parent company, or external to another company, and again may or may not include a promotion.

Stewart (1982; 1991) showed how managers have a choice about how they carry out their job. They can choose the boundaries within which they operate, which parts of their job they emphasise and hence how they operate in terms of which role(s) they emphasise. An example of the role dimension would be as exemplified by the following quote from G3.

> 'My (current) job is in two parts, at least two parts. The two major parts are to do with motivating and directing people, and so I will hardly ever write something myself. I will either tell someone to do something or I'll dictate very quickly in the office some

instructions as I did just before you came in, three or four very short memos asking people to do things. The other part of my role is being part of the board of this company and we happen to be going through a very tough time with an industry imploding on us... '

'I'm a very participative, in there with my people, and my people in here with me sort of manager. I tend not to be behind locked doors just doing things for myself. So I will spend my day either being in this office meeting people or walking round meeting people, and therefore there's little time for me sort of sitting here in a reflective sort of way.'

Executive G3

G3 has chosen to emphasise the contact man role of his current job and make minimal use of the PC in his current job (this aspect of the relationship to the role is discussed in more detail in Chapter 7).

In several cases of job change, especially where it was a promotion, the change in priorities seemed initially to lead to the decline (en4C). An example is C6 who was promoted to Managing Director for a division of organisation C. His predecessor had been in post for fifteen years and inculcated an autocratic management approach and everyone did as they were told without asking questions. C6 was keen to look at how the business and management processes could be improved, part of which involved making people take responsibility for their actions. He also changed the management structure from being functional to product based, where people worked in teams to produce the product. C6 estimates he is currently spending about half his time just talking to people (at all levels) trying to convey his messages across and manage these changes.

There was also the dimension of lack of a basic corporate MIS .

'I want people to see that that's where the importance is being placed, so there is something vaguely symbolic about it (the corporate MIS), but when you've done all that then I can have my, basically, what to many people, and perhaps to myself, would be considered luxuries. It would make my life easier but they wouldn't necessarily make this a better business. Whereas the work we are doing out there will. ... I have to confine myself to wandering into people's offices and getting them to use it for me. There are some things I do and I'll just steal someone's machine and do.'

Executive C6

C6 was an expert-user, but his use has declined rapidly (ep4C) to very occasional, once a month at most, and he is now in an episode (ep5C) where his computer expertise has dropped to a very low level.

In the case of a move to another organisation the dimensions are similar. The most common one for an immediate decline is a change in MIS culture and in particular either from one where it was the norm for executives to use the PC to one where this was not the case, or a change in the level of available technology. For example, in M5's case he was used to a relatively high level of personal productivity tool such as word processing, spreadsheets, graphics and e-mail and preparing reports for himself, but when he moved to organisation (Z) there was not the same level of technology. (The past tense in these quotes is because Organisation M had just taken over Organisation Z.)

> '... in Z the e-mail was about a quarter of the company. .. I didn't use the e-mail system at Z, having used e-mail in my previous company constantly. And the reason was that it was a lousy mail system, old technology. I'll never forget about the second week I was with the company, I went and said, oh, I need to get on the electronic mail system, because I really valued that previously, and they gave me four manuals, four manuals. It was old cumbersome technology, memorise these twenty eight codes and you to can use it. Technically a very robust system ... (but) if you had an Excel spreadsheet you couldn't incorporate that... '
>
> Executive M5

Often several of these 'decline encounters' are going on at the same time. B3 had only been promoted about twelve months before the interview from a role which was heavily operational and task oriented to one which was heavily management focused. This change in role coincided with his disenchantment with the PC, and a re-think about the meaning of life.

> 'There was a time when, yes, I could well have been one of the people who would have spent all my life if I could on the computer and using it for everything, because I was that way minded. Nowadays knowing that my role is more to be out there talking to people and working with my staff rather than sitting behind the keyboard, I try to get out of this office to find out what is going on. I've moved to the point where if I can do something without the computer I'll probably sit at the table with a piece of paper and do it. .. Now it's a case of how can I make best use of my time? If I think I'm about to do something my secretary can do for me, let her do it. It has to be that way. I don't believe I'm really paid to sit behind a terminal all day and write letters.'
>
> Executive B3

Later he talked about how he feels his lifestyle and interests are changing and this has led to a drop off in use. At work he is now more interested in being with his people; outside the office it is being with his children, exercising to be healthy, and getting involved in outside organisations - he is a school governor, and on the local playing fields association. He sees computers as just a tool to use, the novelty has worn off '... (I am) not in love with it now ...'

B3's use and competence (depth and breadth) has decreased, and the decline is probably along path B, that is to say not as steep as C6's and M5's both of whom followed path (C), but not as shallow as C7's who followed path (A).

In both B3's and C6's case there is almost a feeling that they are overwhelmed by their new task. This was certainly the case for some, such as Q3, who were involved with a major organisational re-structuring at the time of the interview. Q3 had just become a novice end-user, but at the time of the interview his use was almost zero .

> '... I can see the need (for a PC); I am actually so harassed at the moment that I just don't get time to take the time to do what I should be doing...'
>
> Executive Q3

The antecedent conditions of the twenty one declining users in terms of their age, gender, educational experience and MBTI profile are summarised are Table 6.17.

Table 6.17 Antecedents of the Declining Users

Antecedent	Distribution			Total
Age	Under 40 (5)	40 - 50 (9)	Over 50 (6)	21
Gender	Male (21)	Female (0)		21
Education	Below BSc (4)	BSc (14)	Above BSc (3)	21
MBTI Core	ST (3)	NT (14)	Unknown (4)	21

Notes: The number in brackets is the number for that sub-group. BSc is taken to include a BA.

This table suggest that males, and users with an NT core are more prone to becoming declining users, but as subsequently shown in Section 6.7.5.1 these relationships were not found to be statistically significant.

Based on the theory of reason action (Ajzen and Fishbein, 1980) and behavioural intentions (Traindis, 1971), it would be a fair comment that for the majority of the twenty one executives the decline was permanent, and there were no signs that

they intended to increase their expertise and use the PC more extensively in the future unless they had no choice in the matter.

For example, G3 had just accepted the post of European Operations Director in another organisation which had offices worldwide. He perceived his new employers made much greater use of technology than the current ones, ' ... I'm fully expecting to have a PC on my desk when I go to Y.' Whilst he anticipates needing to using e-mail he does not expect to use word processing and spreadsheets any more extensively than he does at present, as he expects someone will do it for him.

In the case of M9 (and a very few others cases) there were clear behavioural intentions that he would re-adopt the PC as a tool to support him in his role as a senior executive. He has had an extra telephone line put in at home:

> '.. with a view to setting up an office at home. ... There are times I work over the weekend, and I was wanting to find the time to get in to Powerpoint and understand it a bit better and if necessary pull my own presentation together. That's the theory. '
>
> Executive M9

Only time will tell if he converts his plans in to observable actions. The theories of reasoned action and behavioural intention suggest there is more likelihood that he will, as opposed to those who have no such stated plans, as was the case for most of the declining users.

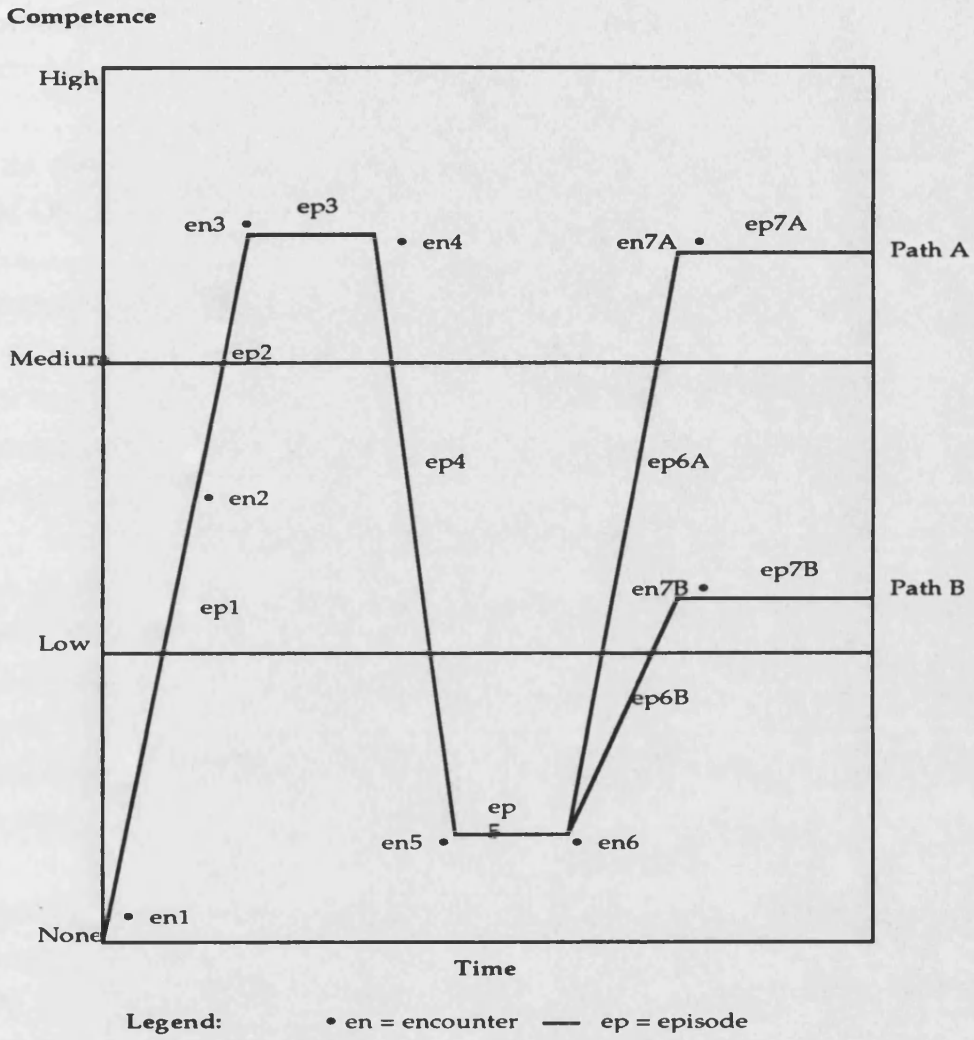
6.7.3 Born Again Users

In six cases the executives (C2, C3, D8, G5, M8 and P2) had either already started to re-use the PC or were in the processes of re-developing their PC skills as shown in Figure 6.14. Clearly, some either will, or have already moved back to their previous level of competence as denoted by ep6A on path (A) in Figure 6.14, whilst others will find a steady state position which is lower than before as denoted by ep6B on path (B) in Figure 6.14. One critical factor in determining the level to which they re-build their level of expertise would seem to be the duration of decline episode (ep5).

D8 is an example of an executive who quickly regained her original level of competence. D8 had worked with word processing, spreadsheets and e-mail since the 1980s. When she moved to organisation D and found she didn't have

these 'tools, it was a bit of a shock.' She didn't even have a PC, but 'quickly persuaded IBM to give her one'. So whilst her decline in use was steep (ep4), the length of the 'minimal use' episode (ep5) was short and lasted only about 3-6 months.

Figure 6.14 Born Again Users



When the PC arrived (en6) she rapidly moved herself back (ep6A) to her previous level of expertise (en7A) and hence steady state position (ep7A). For her the encounters which made her stop developing her competence (en3 and en7A) related to a lack of time and a feeling that she would see no additional return on the investment needed to develop her skills further.

She talked about having several databases in Lotus '... it's much easier than bothering to find out about dBase whatever.' I commented that with her background (as a programmer) I would have thought using dBase would not be a problem, to which she said '... well again you see, it comes down to why bother? If you've got another tool

which is quite capable of doing the job for you and you are familiar with it, why waste your time learning another one?' Similarly, she does her presentations using a word processor rather than a graphics package ' ... because I haven't made the time available yet to learn how to use them.' For D8, it is thus a case of picking up from where she left off and moving back up to her original position on the end-user cube in terms of depth and breadth of use of the PC (that of an end-user 1). There were no visible signs that she intended to develop her expertise any further.

P2 is an example of a born again-user who has followed path B. In P2's case, like that of D8, his decline was the move to his present employer, where technology was 'ancient' and so he made no use at all of the PC for the first six months. The encounter (en6) which made him re-appraise his use of the PC was the arrival of new systems and in particular e-mail (prompted by the appointment of P1, an ardent expert user). During his born again episode (ep6B) P2's frequency of use increased considerably (from weekly in his previous organisation to daily at Organisation P) and the type of software he used changed.

In the past he would have produced his own spreadsheet, for example for budgets, but he can't remember 'when he last built one himself ... at my level mostly I don't have to do (them), the spreadsheets are normally done by other people and I review them. Now it's more e-mail and the word processor which he uses, for example, to produce his monthly report and minutes of meetings which he prepares then gives a disk to his secretary to format and distribute.

P2 says he has 'good intentions' to learn to use the company standard presentation application as he can see it would be more efficient for him to do his own, like P1 and P3, but he has not yet made any concrete plans to do this. At the moment he is in an episode (ep7B) where his overall competence may be less than it used to be (ep3) before his use declined (ep4).

For those where the decline episode lasts longer, when they do have a desire to re-start using the PC, they often find they are almost having to re-learn from scratch. This is especially the case where major technological innovations (such as the advent of Windows) have coincided with the episode of non-use. The gap between their competence and the capability of the technology has become so wide they are faced with learning a complete new set of skills. One could argue that everyone is faced with some form of re-learning as new software is implemented. However, for these declining users in some way they perceive it

as quite a distinct task, rather than part of their everyday routine as illustrated in these comments from C3 and M8.

'... my trouble is just simply I don't have time to go on courses. So everybody else goes and they get Lotus 123 latest version. They all go off and become literate at it, and I haven't even started. The only time I have to do it is at home over Christmas.'

Executive C3

'I've spent time learning Lotus, I've spent time learning HP Mail, I've spent time learning simple word processing packages. But of course we keep changing the packages that we have here. And the truth is I haven't kept pace with the new packages. ... I've always been party to the policy decision. Every time we make one, I think well that means there may be a consequence... '

Executive M8

C3's use had mainly been spreadsheets in the past (under MS-DOS and the organisation is now Windows based), but as indicated in Section 6.7.2 his use had declined in terms of frequency, depth, and breadth of use and he had moved from being at least a medium level end-user I at node (1, 1, 0) to almost a non-user at (0, 0, 0), but now he is moving himself back to being a medium level user at (1, 1, 0).

M8 had remained a frequent user because there was an on-line, in-house MIS system which, like M9, he needed to access daily as part of his job. However, his depth and breadth of use had decreased and from being a medium level user somewhere near the end-user I node (1, 1, 0) he became a novice user (at the 1, 0, 0 node). Now he has had some one-to-one coaching from his secretary on Freelance and hopes to be able to produce his own using the standard templates she is producing for him, and hence move back up to being a medium level user. In his case the main cause of the decline was a promotion within the organisation. The encounter (en6) which motivated M8 to re-learn to use the PC is both intrinsic satisfaction of using the PC and a view about future job market.

'Where I have devoted the time (to using the PC) I have enjoyed it. It's important to understand how to manage people. It's important to get multi-skilled. There's no guarantee that I will be doing a job like this or even have a job in the future, and this is one of the skills that gives you more options in life I think ...'

Executive M8

All six of the born again executive users were taking positive and definite actions to enable them to become once again more competent users and were in an episode of learning (ep6A or B) as illustrated by these extracts, but in most cases it was too early to judge how far they would develop and hence which path they would follow (A) or (B).

The antecedents of the six born again users are summarised in Table 6.18. Despite the propensities of NTs, and the fact that the majority are in the 40 to 50 age bracket, like the declining users, there are no obvious and overwhelming conclusions which can be drawn from the antecedents.

Table 6.18 Antecedents of the Born Again Users

Antecedent	Distribution			Total
Age	Under 40 (1)	40 - 50 (4)	Over 50 (1)	6
Gender	Male (5)	Female (1)		6
Education	Below BSc (1)	BSc (4)	Above BSc (1)	6
MBTI Core	ST (0)	NT (5)	Unknown (1)	6

Notes: the number in brackets is the number for that sub-group. BSc is taken to include a BA.

Again there are no clear patterns to emerge from these antecedents, rather the decision to re-adopt the PC seems to be based on several less tangible factors, such as the benefits of using the PC within their current managerial role, and these are explored in more detail in Chapter 7.

6.7.4 Growing Users

The fourth set of usage patterns were those of the 'growing users', as shown in Figure 6.15. These were executives who had only been using a PC as a personal productivity tool for less than eighteen months and were still developing their competence, and had not yet found their steady state.

The antecedents of the fifteen growing users as a group are shown in Table 6.19. (Some, such as K1 and M7, had a computer at home for about eight years but had only taken to using it in the work environment during the last eighteen months.) The growing users are still finding new ways of using the PC: they have not yet reached their steady state. To some extent these growing users are no different to the steady state users, yet in some ways they are different. First, the majority (73.3%) are over 40. Second, they are all in senior positions and could probably

continue to be non-users. Yet they have been motivated to learn to use the PC. Third, the main encounters (eg., en3 and en4) which punctuate their equilibrium and cause them to further develop their depth and/or breadth of expertise is a new task for which they perceive they can use the PC, rather than technological developments (as was often the case with the steady state experts).

Figure 6.15 Growing Users

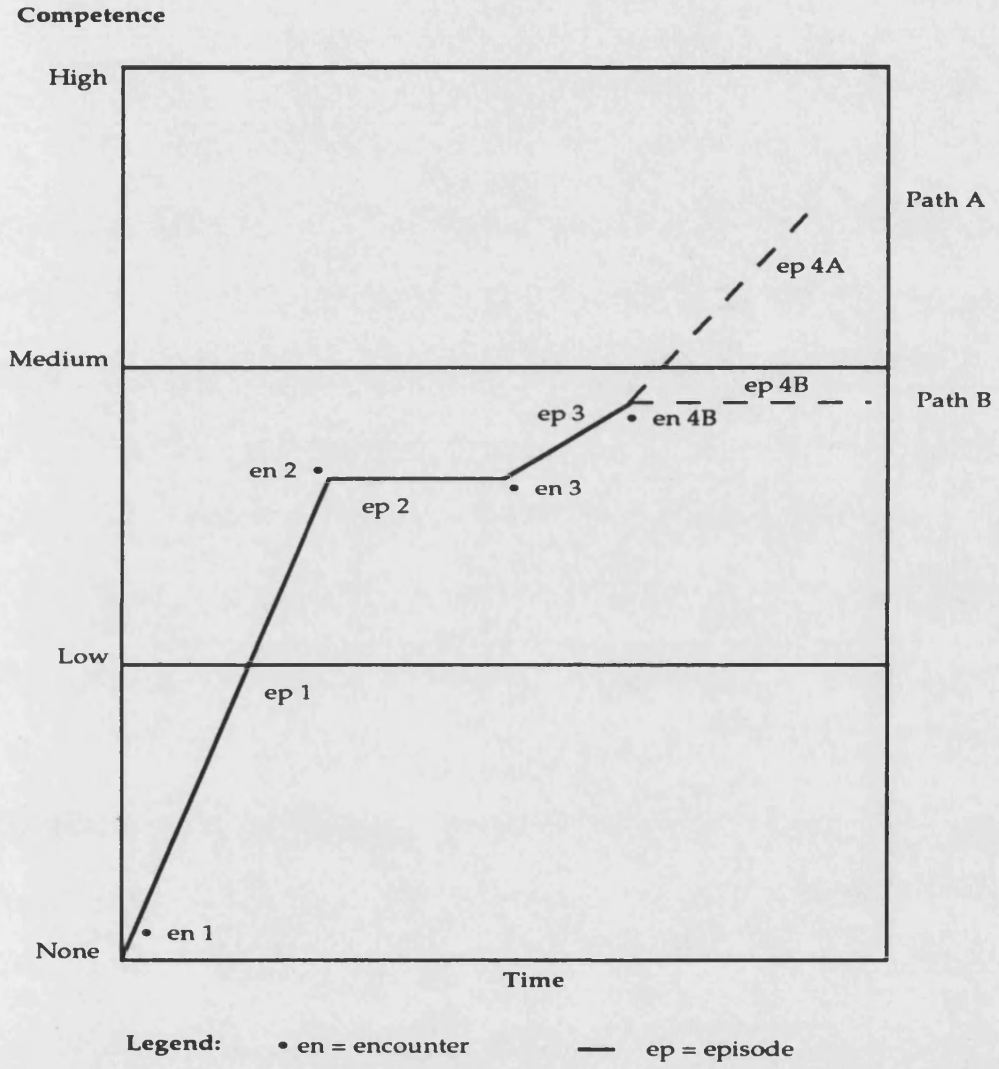


Table 6.19 Antecedents of the Growing Users

Antecedents	Distribution			Total
Age	Under 40 (4)	40 - 50 (6)	Over 50 (5)	15
Gender	Male (11)	Female (4)		15
Education	Below BSc (7)	BSc (8)	Above BSc (0)	15
MBTI Core	ST (5)	NT (7)	Unknown (3)	15

Notes: The number in brackets is the number for that sub-group. BSc is taken to include a BA.

In each case the encounter which led to their starting to use the computer was seeing what their peers and subordinates could do, and feeling in some way left out, as exemplified by D10. Two years ago D10 had hardly used a computer and said to his secretary one day:

> 'I've really got to crack this. You are using all this. I see you opening up things using icons. I have no idea what you are doing. In fairness (too) there were other people around me at managerial level who were using them, so that was quite a powerful driver. It was competitive pressure (en1). I was in an environment where managers were quite adept at, you know, doing the things I do now, younger than me, probably in their late twenties, thirties, people who worked for me who could do it. So there was that. And this was the whole element about not wanting to be seen, well afraid to show my ignorance. So I went off to a couple of programmes.'

The main initial encounter (en1) was peer pressure and a sense of feeling left behind. There then ensued an episode (ep1) of low use and competence.

> 'I didn't have a PC but it began to fill in gaps, and then I took the plunge in November '93 and went out and bought a PC for home (en2) and then just sat down and just got in to it and just started using it, and disciplined myself to do about an hour a day and started using the tutorials on the system and off I went. And that was all about not using it for work at that stage (ep2).'

In ep2, he started by producing letters, some presentations, and spreadsheets for home finance, recipes and a database of his wine cellar. Then:

> '.. having set that up, my knowledge and understanding of things like files and all those other sorts of things, hard disk, ... then when I came here I could then actually see the practical application for work base (en3).'
>
> Executive D10

Now in his third phase of developing his competence (ep3), he produces most of his own documents, presentations and spreadsheets and accesses external databases via CD-ROMs. Essentially this episode is a learning curve rather than an equilibrium phase, with several minor episode en-route which are prompting D10 to continue to develop his PC competence.

At the other end of the scale in terms of depth and breadth of use is Q5 whose main interaction with the computer is e-mail and an in-house mainframe sales

and marketing management information system, which he uses to interrogate though he cannot change any of the data. He is a novice user compared to D10 who could be regarded as an advanced user (end-user II).

Q5 is over 50 years old and has had a computer on his boat for about 10 years for navigating and he remembered using a computer as an undergraduate, but had not used one for work.

> 'I always wanted to use it, but for a long time the kind of information I needed was not on the machines, or not in the right format. I cannot go through the sales statistics of the day, country by country, that is just not my task. So it has to be condensed information. ... It took time, not from a technological point, but just to get the information, because it was just not available. ... Then when it was available and reliable enough, I took the step to have it on the computer (en1).'
>
> Executive Q5

These extracts from D10 and Q5 are typical of the descriptions given by the other fifteen growing users. Again, these growing users have behavioural intention which suggests that they will become steady state users although only time will tell what level of competence they reach. Some, like D10, are already on the path to becoming highly competent high level steady state users operating at the end-user II node of the user cube (1, 0, 1).

Others are more like Q5 and may remain novice users. Nonetheless 73% of these growing users have defied the commonly held, but as we have seen here infelicitous notion, that the older executives are less likely to take to the computer, and that what one really has is a 'generation' problem which will go away, because the next generation of users will all be computer literate (Grindley, 1991; 1992). Indeed, four of these growing executive users (26.7%) who are only just starting to use the PC as a personal productivity tool are over fifty, and four are under forty years of age.

6.7.5 Declining Users versus the Other Users

Table 6.20 and Figure 6.16 show the distribution of the total sample by path. The question remains as to why some executives continue to use the PC (steady state users) whilst others (nearly a quarter of this sample) allow their competence to decline and in some cases become almost minimal users. A comparison of the declining and steady state users by MBTI core profiles, age and genders is shown

in Tables 6.21 to 6.23. An initial inspection of these tables suggests that perhaps NTs are more likely than STs to become declining users and similarly males are more likely than females to become declining users. Chi-square values were computed as follows: for MBTI core = 2.85; for age = 0.2 which shows there is no statistical significance for these relationships at the 5% level. (The Yates correction was applied to the calculation for age because for one cell E<5.) In the case of gender two cells had E<5 and it was not possible to calculate the chi-square value.

This lack of statistical significance between either the sociodemographic data or the MBTI profile data is not surprising because, as the results of the part of data analysis indicate, the extent and continuity of use that executives make of computers is related to a more complex set of issues which includes the role(s) and the associated demands and constraints within which the executive works.

Table 6.20 Sample Composition by User Path

	Steady State	Declining	Born Again	Growing	Total
Number	36 (= 46.15%)	21 (= 26.93%)	6 (= 7.69%)	15 =(19.23%)	78

Note: The total includes two executives who had been users but were complete non-users at the time of interview, and are therefore included in this table as declining users.

Figure 6.16 Sample Composition by User Path

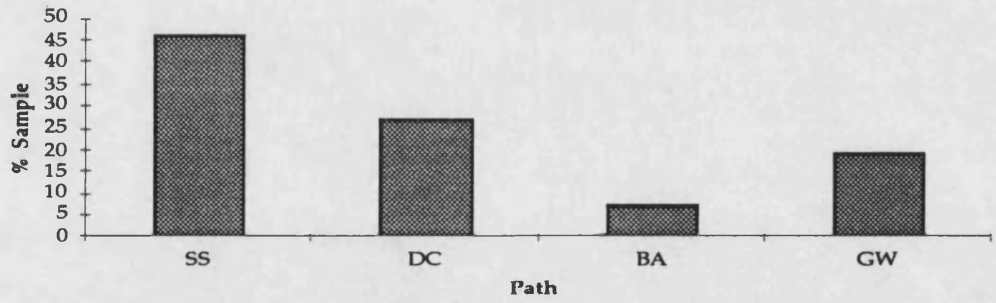


Table 6.21 Comparison of User Path and the MBTI Core

	ST	NT	Total
Declining Users	3 (= 17.65%)	14 (= 82.35%)	17
Steady State Users	11 (= 42.31%)	15 (= 57.69%)	26
Total	14	29	43

Note: % represents the % of users with the core type.

Table 6.22 Comparison of User Path and Age

	Steady State	Declining	Total
Under 40	6 (= 16.67%)	5 (= 23.81%)	11
41-50	22 (= 61.11%)	10 (= 47.62%)	32
Over 50	8 (= 22.22%)	6 (= 28.57%)	14
Total	36	21	57

Note: % represents the % of users in the specified age range.

Table 6.23 Comparison of User Path by Gender

	Steady State	Declining	Total
Female	3 (= 8.33%)	0 (= 0%)	3
Male	33 (= 91.67%)	21 (= 100%)	54
Total	36	21	57

Note: % represents the % of users of the gender type.

At this stage of the analysis there seem to be three qualitative differences, between the declining users, and particularly those whose use is now quite low and looks set to remain so, and the other users and especially the high level users (end-user II and expert), as summarised below in Table 6.24.

Table 6.24 Qualitative Factors Differentiating Declining Users from Other Users

Factor	Declining Users	Steady State, Growing Users, and Born Again Users
Initial encounter	Not motivated by any intrinsic interest in computers indeed, for some such as the accountant like F4, use was almost mandatory, eg., C4, G3 and M5	The first encounter is often by choice and/or in response to an interest in the technology, eg., E2, D10, L4, J4 and Q5
Link to their overall management philosophy	It is as though their use of the PC is seen as an auxiliary tool they use if they have to, eg., B3	It is as though the use of the PC has become interwoven in to their *modus operandi* and when it is not there they miss it, eg., B1, C1, D8, E2 and F1
Intrinsic motivation (1)	On the whole, no sense of enjoyment is particularly discernible from the interviews	Often there is an indication that they gain some enjoyment (fun, pleasure, etc.,) from their use of the PC, eg., see the quotes from C1, E2, J1, L5 and M9

Note: (1) Igbaria *et al.*, (1995a) specifically noted the role of intrinsic motivation with respect to use.

This supports Rogers's (1983) general findings about innovations and reinforces Martin's (1988) specific findings with respect to the adoption and discontinuance of a DSS. Rogers (1983) found that the relationship between the sociodemographic factors and continuance and discontinuance was equivocal. However, 'late adopters' were more likely to discontinue their use of the innovation than the 'early adopters'. Rogers (1983, pp. 167-168) posits that the late adopter's knowledge about how to exploit the innovation may be limited to 'how-to knowledge', that is only 'the information necessary to use the innovation properly', rather than 'principles knowledge' which enables users to understand the concepts behind the innovation and apply it to more general situations.

Herriot and Pemberton's (1995) concept of 'knowing beyond' supports this proposition. Rogers (1983, p. 188) also suggests that late adopters may have had less freedom in their decision to adopt and be less innovative about their use of the innovation and may not have therefore either integrated the innovation as fully into their on-going practices as the early adopters, or gained as much advantage from the innovation as the early adopters. There was no concrete evidence in this study whether the declining users were leaders or followers. However, for most their initial encounter was reactive (either to peer pressure or a task in-hand) and as such are more characteristic of the 'late adopters'.

Martin (1988, p. 119) found that the main reasons managers discontinued their use of their DSS was because the output no longer met 'role requirements' and/or they found the systems interface too difficult. However, a key factor for continued use was the integration of the DSS into how the manager operated. In terms of quantifiable sociodemographic factors, he found no statistical evidence to differentiate those who continued from those who discontinued their use, except previous computer experience if present in sufficient amounts. There is some evidence from this study to support this, in that nearly all the expert users expressed an intrinsic interest in computer technology.

With regard to the MBTI core data, NTs because of their disposition towards innovation might be expected to be proactive users and more like Rogers's (1983) 'early users'. Equally, they may be more prone than STs to become declining users, as the novelty value wears off and they seek the next challenge. By contrast, the longer the ST uses the PC the more it will form part of his habit and as he seeks to maintain the *status quo* he may be more inclined to remain a steady state user.

6.8 Summary

Analysis of the data on the level of use executives make of the computer has shown that executives as end users can be broadly categorised into four groups, depending on the breadth and depth of use they make of the applications available to them. With respect to how their use changes with time, this has been analysed in terms of three main dimensions of the executive end user cube shown in Figure 6. 8, namely their frequency of use, and their depth and breadth of use of applications. Four paths have been identified which can be used to describe executive end-users: the steady state user, the declining user, the born again user, and the growing user. Typical encounters and episodes within these paths have been explicated from the data. To understand why these encounters and episodes might cause a change in use one needs to look at how use is related to the jobs, roles and contexts within which executives operate.

CHAPTER 7 - Executive Work and the Use of the Computer

This chapter presents the analysis of the data in terms of the tasks for which the executives used the computer to support them, the benefits they perceive they derive from their personal use of the computer, and conversely the drawbacks they perceive result from this use. The results are presented and discussed within the context of their *modus operandi* as senior executives and in particular the frameworks of managerial work discussed in Chapter 3.

7.1 Introduction

Consider these two excerpts from executives C1 and G3. C1 is the managing director of a business within organisation C and is a steady state expert user who uses his computer daily for a variety of tasks which range from responding to an e-mail to encapsulating his thoughts for a marketing campaign.

> 'What I do is be creative, innovative and entrepreneurial, and persuade people about my good ideas, or they persuade me about their good ideas. That's what I actually do. Now nowhere in there, is sitting at a keyboard, it's all about communications, and talking to people. So if you like it's a means of helping me communicate, both communications in incoming information and communications outgoing, so it fits in that scenario of communications.'
>
> Executive C1

Executive G3 is the Operations Director of Organisation G and (as highlighted in Chapter 6, Section 6.7.2) his use has declined from a high level frequent user to a medium level occasional user who mainly uses the PC at home, when he is developing new strategies for the organisation.

> 'My job is in two parts, at least two parts. The two major parts are to do with motivating and directing people, and so I will hardly ever write something myself. I will either tell someone to do something or I'll dictate very quickly some instructions. I'm very participative, in there with my people, and my people in here with me sort of manager. I tend not to be behind locked doors just doing things for myself. '
>
> Executive G3

During the interviews the executives spoke, as illustrated by these two excerpts, about how and why (or not as in G3's case) they used the computer

to support them as senior executives primarily either in terms of how they operate, that is their job and roles and hence how they spend their time, or some personal disposition towards computers. Other researchers, as discussed in Chapter 3, have developed models of why managers use a PC which indicate that use is related to perceived benefits, but mainly in terms of personal productivity and advantages and with no explanation as to why these are seen as benefits. To some extent they are therefore lacking in context.

As shown in Chapter 6, the condition of installing e-mail may be necessary but not sufficient to induce an executive personally to use the computer. The data obtained from the interviews in this study suggest that the use and benefits executives make of and obtain from a computer are very closely linked to the executives' perception of their roles, the nature of their work, and their personality, and hence the data are context sensitive. Context in this instance implies the context of managerial work as discussed in Chapter 3.

This chapter presents the analysis of the interview data with respect to the:

- tasks for which the executives personally use the PC;
- benefits the executives feel they derive from their personal use;
- drawbacks the executives perceive to their personal use of the PC.

First, there is an overview of all the tasks (Table 7.1) for which the executives in this study used their computers (Section 7.2), and the benefits and drawbacks (Section 7.3) they perceived result from using the computer in these ways. These results are based on the analysis of the total sample of 85 executives.

Second, there is a detailed examination of six executives in terms of their perceptions of their managerial *modus operandi* and personality to explicate how and why they use the computer, and the associated benefits and drawbacks are intimately linked to these two aspects of them as individual executives. These six executives were drawn from the group of twenty five 'best' interviews which were analysed in detail to identify the core categories. These six reflect the three broad levels of competence identified in Chapter 6, Table 6.12, namely low (novice users), medium (end-user I) and high (end-user II and expert). Excerpts from other interviews are included where appropriate.

Consonant with the principles of Grounded Theory, outlined in Section 4.7.2, the rationale for choosing these six was as follows. As the relevant proceeding sections will illustrate, the analysis of the novice users' interviews revealed many of the key categories and associated concepts. However, Glaser and Strauss (1967) suggest continued analysis, in order to saturate these categories and concepts, identify all the properties associated with them, and identify any further new categories and concepts, and hence build up a complete picture. Furthermore, they advocate analysing data which represents the extreme limits of the phenomena being investigated (in this case computer usage), in order both to validate whether or not the identified categories and concepts and their associated effects still hold, and look for more subtle properties of the categories.

As will be shown, and indeed one might expect, the interviews of the more experienced users did reveal both additional categories and concepts, and more subtle properties related to the categories and concepts initially identified. The rationale for choosing two interviews which represent each of the three broad groups of competence was therefore to keep to the principles of the Grounded Theory method for data analysis, rather than imply either any relationship between the categories and the level of use, or differences between the groups.

There were several ways the data relating to the executive as an individual could have been analysed, for example, by looking at the MBTI profiles and using the managerial role as the supporting data, or taking the managerial role as the main point of analysis and using the MBTI profile as the supporting data. The latter was chosen first and foremost because from the transcripts the job and associated roles seemed to come across as the more dominant theme, as illustrated by these quotes from C1 and G3. Second, the job and role data were more complete as there was always an opportunity to explore them in the interview, whereas the MBTI was optional. (As discussed in Chapter 4, there is always an element of subjectivity in what one sees as the dominant theme, for as Hirschheim *et al.*, (1991, p 591) pointed out, nearly all interviews are 'theory impregnated'. Bearing this in mind this researcher acknowledges that this is but one way of analysing the data from this study. However, she feels for the reasons stated and in keeping with the principles of Grounded Theory, it was the most appropriate method for this study.)

In terms of which interviews to choose again there are several options, which range from taking a representative sample to including all the interviews, and from presenting an in-depth (case-like analysis) to a more superficial analysis. It

was felt that taking a representative sample (in this case six), analysing them in-depth and supplementing them with extracts from other interviews would enable the whole picture to be seen most clearly. All the interviews could have been analysed in detail, but Grounded Theory suggests this would probably not add any additional substance to the analysis.

The third and last part of this chapter comprises a discussion of the results of this analysis.

Table 7.1 Tasks Supported by the Use of the PC

Categories of Use	Associated Concepts
Being 'well informed' about their business[1]	Interrogating internal information systems, eg., daily sales figures, production data, hazard analysis, product information Interrogating external information systems, eg., competitors, clients, their business environment, share movement
Communications (internal and external)	Producing own internal and external communications using word processing software (and e-mail as appropriate) Preparing visual aids and/or text for presentations[2]
Document preparation	Preparing documents of all lengths[3]
Determining strategy	Preparing strategy documents (text-based), eg., re-structuring the organisation, new business scenarios Preparing financial plans
Problem recognition	Looking at 'one or two fad ratios'[4] Looking at daily sales figures and production data 'Poking around the data'[5]
Personal information management	Bringing forward correspondence, diary management, contact management and time management, to do lists
Financial modelling	'Being comfortable'[6] about a decision What-if analysis, eg., headcount, acquisitions, manpower vs sales volume, budgeting and re-budgeting, profitability, contingency planning, risk management Preparing and controlling budgets Salaries Manpower planning Sales forecasting 'Data reduction'[7] 'Need to understand the data'[8]
Confidential matters[9]	Restructuring, reducing the headcount
Project management	Keeping track of projects

Notes:

1. Term taken from Boone (1991)

2. The extent to which executives prepared the material for presentations varied from an outline which they handed over to someone else to finish (especially in the case of the visual aids), to producing the complete package including visual aids and handouts. Also the format of the presentation would vary from simple overhead transparency prepared from a screen print off an EIS, to a presentation produced using a specialist graphics package, the latter being the domain of the more expert users.

3. Similarly, the extent to which they prepared documents ranged from completing and distributing these themselves to handing over to their secretary a file with the text. The secretary would then lay out and distribute the document. The length and complexity varied too, from a short block of text, eg., 2 lines, to long multi-formatted ones (which could comprise spreadsheet, graphics and text). The more expert users were usually the ones who completed their own documents regardless of length and format.

4. and 5. Several spoke about scanning the data for signs of potential problems. The ways of scanning the data included taking the data and inputting it into spreadsheets - to look at ratios which meant something to them - as one executive (C1) said 'one or two fad ratios', - whilst others would be 'poking around the data' (C7) looking for anomalies and inconsistencies. For others the looking took the form of perusing pre-prepared EIS or MIS reports.

6. In many cases the executives talked about modelling the financial data on a spreadsheet to support their thinking about a decision they were making and thus 'be more comfortable' (C7).

7. Some executives would extract key data from the monthly wad which was produced by MIS and input it into their own spreadsheets, thus, as (B1) said, doing their own 'data reduction'.

8. In many ways this use is similar to that of 6, whereby the executive would play around with the data until he felt he understood them better. However, there was not the same implication about making a decision, rather they were expressing a need to see how and why the results they were given were obtained.

9. Some spoke not of the task, but rather the nature in terms of it being 'confidential', and these categories were some of the tasks they then mentioned in this connection.

7.2 Tasks Supported By the Use of the Computer

During the interviews a wide range of tasks were mentioned for which the computer was used (regardless of type, eg., PC or a terminal linked to mainframe). As with the data from Chapter 6, the first and most pressing problem was how to group similar tasks whilst at the same time not reducing the data to the point where meaning was lost. The procedures of deductive content analysis outlined in Chapter 4 were used, and in particular the techniques described by Miles and Huberman (1994) and Weber (1990) and the more specific

guidelines of the Grounded Theory Approach (Strauss and Corbin, 1990; Turner, 1981). Similar types of use were grouped together to form the 'category' headings shown in Table 7.1. These category labels were deduced either directly from the interview data or the literature.

7.3 The Benefits and Drawbacks

Executives were asked to describe the benefits and drawbacks they perceived which derived from their personal use of the PC. Where the usage had changed over time, and particularly for the declining user, they were asked to recall what benefits they had enjoyed in the past and whether or not they missed these now. Again, as one might expect, a large range of benefits and drawbacks was cited. As with the tasks, there was a need to reduce them to a data manageable set. The range of benefits and drawbacks was first mapped to look for similarities and links using the COPE cognitive mapping software programme. From this, six main categories of benefits with associated concepts were identified, as shown in Maps 7.1 to 7.6[1], namely:

1. Gaining personal competitive advantage - Map 7.1;
2. Improving personal productivity - Map 7.2;
3. Being more flexible - Map 7.3;
4. Enhancing the thinking process - Map 7.4;
5. Achieving personal satisfaction - Map 7.5;
6. Making better decisions - Map 7.6.

Eight main categories of drawbacks were identified, and these are shown in Map 7.7:

1. Pace of technological developments;
2. Making time to learn to use the PC more effectively;
3. Producing senseless information;
4. Losing of social contact;
5. Inhibiting delegation;
6. No critical mass of users;
7. Implications for the secretary's job;
8. Travelling habits.

---

[1] All maps referred to in this chapter are to be found in numerical order at the end of this chapter; main categories are shown in bold type face.

An initial analysis of these benefits and drawbacks, as isolated quotes, yielded little which others had not observed before, such as Boone (1991), King et al., (1992), McKinnon and Bruns (1992), Martin (1988) and Rockart and DeLong (1988). Nonetheless, there are still questions, for example, why do:

- the executives in this study use the PC in the ways outlined;
- some make more extensive use than others;
- some allow their expertise with the computer to decline with time.

Insights into the questions of why rather than the how only started to emerge when each of the first thirty five interviews was mapped and explored in the context of how executives spoke about their work in terms of the jobs and associated roles they performed, the processes they used to execute those roles, and the contexts within which they operated (as shown in Maps 7.8 to 7.13).

For the reasons outlined in Chapter 3, frameworks of Isenberg (1984), Mintzberg (1973), Kotter (1982), Stewart (1982; 1991) and Weick (1983), and especially that of Mintzberg's (1973) ten managerial roles, were deemed to be the most helpful frameworks for understanding and interpreting why these executives used their PCs in the way they did (or not as the case may be). Mindful of Doyle's (1991) and Weick's (1990a) caution about using frameworks, this researcher must stress that this is one way of interpreting the data which was helpful both in terms of reducing the data whilst not losing the overall content and in making 'sense' (Weick, 1990a) of the data, as others had found, such as Martin (1988), Rockart and DeLong (1988) and more recently Vlahos and Ferratt (1995).

7.4 The Use of the Computer in Relation to Executives' *Modus Operandi*

In this section is a detailed analysis of the interview data from six executives (C7, D1, D10, E4, E5 and F1). The use of the computer is interpreted in the light of these frameworks and in particular Mintzberg's (1973) ten managerial roles is used as the template for each analysis. The MBTI profile data will be used as appropriate to support the interpretation of the executives' actions and processes. It must be noted that in most cases, these executives played several roles, and where extracts are quoted these were used to try to interpret their use of the PC rather than indicate that these were necessarily their only roles. As outlined at the start of this chapter, the executives will be discussed in three groups according to their current level of use (low, medium and high), beginning with the low level users.

7.4.1 Low Level Users

Two low level users, E1 and F1, encapsulate most of the key themes and concepts related to this group of users and why they do or do not use the computer.

7.4.1.1 Executive F1 (Map 7.8)

F1, as indicated in Chapter 6, is a steady state novice user with an INTP MBTI profile. Take first the interpersonal roles of figurehead, leader and liaison. Given the nature of these interpersonal roles one might not expect to find any direct uses of the PC which supports these roles, other than that of leader. The Deputy Managing Director for a Division of a public utility described his job as follows.

> 'My job is to guide, steer, nudge, lead, control where necessary, but monitor and make the whole thing tick. I'm the public face of (the utility in P). So there's a lot of media work, and television and radio and that sort of thing. And I'm also the public face as far as the six hundred staff are concerned.'

From an internal perspective (F1) talked about how he kept selected personnel data on e-mail as a reminder about when and to whom he should talk. For example, if someone is off sick, he looks at their age, marital status, etc., in order to make a more informed decision about what to do for them. He can see who is due for retirement each month and hence who he should phone and wish good luck. Other executives such as J4 talked about making similar use for people's birthdays.

F1 will have to make a statement to the press if there has been a disaster. He likes his engineers to send him a report on e-mail so that he can read it before talking to them. In this way he feels he can ask more informed questions of his engineers and prepare himself more effectively for the press briefing, in contrast to waiting either for a paper-based or verbal report to arrive.

F1's use of e-mail, as discussed in Chapter 6, supports his leadership role in terms of setting the role model, a point further illustrated by this comment which was made in relation to his endeavours to move to a more open information culture.

> '... they (other managers) do not believe they should share, and have given their managers instructions not to use it (e-mail). In any organisation we have those sorts of

hurdles to overcome ... my job is to find the people and try to drive that out - but all the time they are there, again it leads to a different rate of take up.'

Executive F1

Here we see F1's use of the computer and in particular e-mail supporting him in the roles of figurehead, leader and spokesman, and pursuing his agenda (Kotter, 1982). The use to support the leadership role is in fact two-fold, as both the Divisional Head, and the head of the corporate MIS function for which he had just been given responsibility. Turning to the informational roles, he uses e-mail to communicate and sometimes uses the word processing capability to help him prepare an external speech. So here he is using the computer to support him in the disseminator and spokesman roles.

For the decisional roles, for example preparing budgets:

'... my decision-making is made by one-to-one or group discussions and decisions being made rather than analysing data and coming to decisions. Other people are doing that analysis. That isn't to say I don't spend a fair amount of time looking at data, but it's usually for information.'

Whilst he admitted 'that's (using spreadsheets) one of the areas where I feel very ignorant', he does not 'feel he has a need to use them' because as indicated he has other people to do the detailed analysis. Whilst he doesn't use the computer for detailed decision-making he had just prepared the recent restructuring strategy with five colleagues, all via e-mail. Ideas would be drafted on e-mail and sent back and forth before the strategy was agreed and made public.

Within the context of which he worked, F1 found using e-mail helped him deal with the 'fragmented day' as he could read his e-mail in short bursts in between the interruptions, and also deal more quickly with the problems in the e-mails.

'... one of the things that as you get more senior you tend to do, especially if you are in a general management role is that instead of having an hour and a half to spend on a topic you end up with fifteen seconds, but that fifteen seconds is always with difficult decisions because people only come to you with the difficult things... It's lots of little things most of which are important, but don't require huge inputs of time.'

In terms of his personality, he is an INTP (introverted thinker), albeit he has only a slight preference for I, which means he could just as easily be an ENTP

(extroverted intuitive). On the one hand one might, therefore, expect that e-mail would appeal as a means of protecting himself from the outside world. On the other hand, the weak I means he can be just as comfortable dealing with the outside world and people, and indeed this came across when he talked about how he makes decisions, ie., from talking to other people, and his perception of losing personal contact as a downside to his use of the computer.

The NT core would incline him towards being innovative and trying new ideas, as he is doing with his use of e-mail, and being more inclined to want to see the big picture rather than the detail. The latter is reflected in how he talks about making decisions; he is interested in the 'information' rather than the detailed analysis. His visionary capability was also one of the factors which motivated him to use e-mail in the first place.

> 'It was one of those things without which I could not imagine an office five years hence ...the best organised companies five years hence, it would be almost the *sine qua non* of a good company. They would be using electronic information and data and networking ... it would be routine.'

The benefits F1 perceives he obtains from his use of e-mail, as shown in Map 7.8, include the categories of improving personal productivity (Map 7.2), being more flexible (Map 7.3) and enhancing the thinking process (Map 7.4).

For F1, the concepts associated with the category of 'improving personal productivity' were related to those labelled 'doing things quicker'. For example, 'speed' (Map 7.8), for F1 is about saving time by personally executing task such as sending memos and preparing strategy documents and monthly reports. In the case of the last-named task, his secretary now provides him with an e-mail file and together they edit the reports on-line. This task used to take about one and a half days and now takes a few hours.

In terms of the overall category of 'being more flexible' (Map 7.3) there were two associated concepts.

1. 'Communications across boundaries', which for him is about being able to communicate across hierarchies which is related to his agenda of creating a more open information culture, and flattening, the management structure, and being able to 'communicate quickly (and) let the right people know when there is something important going on'.

2. 'Being able to work anywhere at any time' in terms of always having the information and documents he wants available on his computer - 'it's there all the time, I suppose that is what has impressed me.'

His use also helped him 'crystallise his thoughts' when preparing a speech which is linked to his spokesman role (Map 7.8) and the overall benefits concepts of 'enhancing the thinking process' (Map 7.4). The last significant benefit for F1 was that it 'keeps me in touch' by being able to log in wherever he is in the organisation, which is linked to his role of monitor (Map 7.8) and the overall category of benefits of 'improving personal productivity' and specifically the concept labelled 'always being available with e-mail'.

As to the downsides (Map 7.8), he commented that 'he had never been asked that question before' but perceived the main disadvantages were those labelled 'losing social contact', 'no critical mass of users' and 'inappropriate use of the technology'.

- 'Losing social contact. 'You have to remember it's people out there and not machines', so he will make a conscious effort from time to time to phone people 'just for a chat'.

- 'No critical mass of users'. This is true in that, as indicated, not all his managers and fellow directors are on-line, nor do they all share his enthusiasm for the system. Indeed few of the other directors use e-mail and those that don't regard his use as a little eccentric. INTPs often rebel against rules and regulations and this view of him held by his peers may well just heighten this aspect of his personality.

- 'Inappropriate use of the technology' and specifically managing the increasing volume of e-mails so that it remains an effective tool. 'I'm now on that bit of the curve and scared is a silly word to use, but I'm worried. How long is that going to go before we reach the sensible point which is the plateauing point where your usage has reached the magic figure which is the balance between effectiveness and ineffectiveness.'

Map 7.8 and this discussion have shown how these benefits and drawbacks are linked to his perception of his management roles (such as that of leader, figurehead and spokesman), the context within which he works (fragmented day and often being away from his office), his management agenda and thinking processes, and certain aspects of his personality. His use of e-mail is also congruent with some of his personal management philosophies and agendas,

such as the way managers use the phone, as discussed in Chapter 6, and creating a more open information culture, which is again linked to both his leadership role and personality.

As discussed, it was primarily F1's intuition, tied in with his personal management philosophy and perceptions about his role, that acted as the encounter (en1) which initiated his becoming an end-user. He had a perception that there should be a cost benefit but feels 'it is very difficult to quantify ... there is the elimination of phone calls, not just the cost but the hidden cost of the disruption and re-prioritising...'

This analysis of F1 has shown how the interplay between his perception of his job and the associated roles and his personal preferences and dispositions combine positively to promote his use of the computer.

7.4.1.2 Executive E1 (Map 7.9)

The second detailed analysis is of E1, a declining novice user who has an ISTJ MBTI. E1 has been a medium to high level user in the past and is now almost a non-user. He works in an industry where he is surrounded by scientific technology such as spectrometers, and his organisation believes that 'creativity, and innovation, technology and judicious capital investment are the key factors that drive our business' (Company E's Annual Report for 1995). This is how E1 sees his role.

> 'My life here is generally on my feet. When you're managing factories and looking after operations where orders are being booked all the time and customers are on the phone all the time, you don't spend much time on your backside. You tend to be running around trying to help lubricate the wheels and keep things moving, and going down and meeting people. I've got a lot of people in the various departments that I'm responsible for and I like to be meeting them all the time.'
>
> 'I can't cut myself off, because I see it as part of my job to be in a position to respond. If there is an angry customer he doesn't want to know that I won't be available for the next hour because I happen to be composing a report ... I see my role at work to be available at work all the time.'

In this extract he portrays himself very much as a real-time manager and such managers tend to focus on the decisional role of disturbance handler (Mintzberg 1973). E1 is an ISTJ with a 'very clear' preference for all but the S function which

is very weak. As discussed in Section 3.17.3 one therefore might expect him to assimilate with the PC, both from the perspective of preferring the inner world and having a strong ST, and hence a liking for detailed analysis. Indeed he uses the mainframe MIS stock control system when he needs hard facts and to make decisions related to day-to-day production issues. However, he does not use the PC for any form of personal productivity, preferring rather to write and then have memos, etc., typed by a secretary.

> 'The things that I access on the mainframe computer which I am not able to access from outside (the organisation) then I have to do while I am here, whereas my writing (as in memos and reports) I know I can do at home, and I get peace to do it at home. ... I suppose the real problem is in my case that I do a lot of my thinking and writing and difficult memos out of here. ... So, I need the flexibility of being able to do this work wherever I want to.'

ISTJs are characterised as hard workers, sincere, careful to keep track of the facts and generally seeking to maintain the status quo (Hirsh and Kummerow, 1989, p. 71) which is in keeping with how E1 approaches his role.

> 'I like to be down in the factory walking around. ... I like to make my presence felt all the time, and all the time keep following up important things that I know are going on because I want to know what's happening. But more importantly I want people to know that I'm interested in what they're doing. To show genuine interest you can't go down just with bland generalised statements, you really have to show that you know what's going on, and what they've been doing. ... That motivates people better.'

To some extent this is a paradox, because his strong preference for sensing will compel him to find out what is happening as he does. However, as a strong I (45) one might make expect him to de-emphasise the interpersonal roles and shy away from dealing with people and the outside world. (It is almost as if he is making a conscious effort to be with his staff to counteract this preference for the inner world.) On the other hand, the notion of being with his people is consistent with more traditional management concepts of 'acting with' his body (Zuboff, 1988). E1 is leading primarily with his physical presence and achieving leadership through his direct actions in contrast to F1 who is leading both through his direct actions in terms of setting the role model, and through people and information with his use of e-mail (Mintzberg, 1994). Here, therefore, as in earlier comments from both B3 (in Chapter 6) and G3 (at the start of this chapter),

one sees the perception of leading by physical presence mitigating against executives using the computer.

It is notable, too, that both F1 and E1 spoke about having fragmented days, yet for E1, this is just another reason not to use the computer. E1's behavioural intentions to re-learn to use the PC are almost non-existent, as discussed in Section 6.7, which is in part because he likes writing with pen and paper, and in part because he was once a 'PC addict' and having broken the habit he is reluctant to start again. Discussions with others in organisation E revealed that E1 was very highly regarded for the way he handles his role and his contribution to the business, and as he said in an earlier extract in Chapter 6, he has had no need to re-examine his managerial behaviour. Furthermore, as an executive with a strong traditionalist (ST) core one might expect him to show less personal disposition to change unless there was a very good reason.

Here the demands of job and role, as perceived by E1, combined with his MBTI profile serve to mitigate against his use of the PC. His behavioural intention too is weak and so there is no one factor acting in terms of either the theory of reasoned action or behavioural intentions either to pull or push E1 towards the PC, indeed quite the opposite. E1 is very much working from the premise of 'knowing how' and 'knowing that', which is again what one might expect from an ST. Indeed E1 is typical of what Herriot and Pemberton (1995) describe as a professional manager (see Table 3.5), whereas F1, is more like their description of a general manager - and even although he is only a novice user he is still 'knowing beyond' to see how he can use the computer to help him execute his different managerial roles.

7.4.2 Medium Level Users

From the analysis of F1 and E1, many of the links between the executive's use of the computer and his personality start to emerge. The analysis of two medium level users (C7 - Map 7.10 and D1 - Map 7.11) explicates some of the other benefits and drawbacks shown in Maps 7.1 to 7.7 and shows links to other managerial roles and especially the informational and decisional roles which were not seen in the previous analysis.

7.4.2.1 Executive C7 (Map 7.10)

As discussed in Chapter 6, C7 is medium level frequent user, but his overall level of use has declined slightly in terms of depth and the breadth of his expertise. He has two PCs (one at home and one in the office) which he mainly uses for preparing documents (word processing) and financial modelling (spreadsheets), and a palmtop for diary management. C7 is the Finance Director for a self-contained business within Organisation C and is responsible for finance and MIS. His financial responsibilities include making decisions on acquisitions, and is to some extent characteristic of both the entrepreneur and the expert manager. Like F1, he is responsible for MIS.

In the interpersonal roles he uses the PC much like F1, as indicated in Chapter 6 and Map 7.10, to set the role model and reinforce the organisational culture generally and specifically in terms of the use of computers. The organisational culture throughout Organisation C is summed up by this comment.

> 'Do it quickly, sharply and effectively, and that sort of pervades the whole organisation to an extent, and certainly pervades it when we are looking at IT. ... PCs are the norm within (our division of C). ... They are well entrenched in the culture. ... It's become a real integral part of the culture here to say "I'm self supporting".'

Like F1 his use, and especially doing his own memos, also supports some personal 'strong beliefs' and the personal agenda he is pursuing.

> '... secretaries ought not to type, they ought to be administrators'. Second, he also believes if one does one's own memos 'you are more likely to get it right first time, rather than the editing loop one can get into when someone else does it'. Third, he is against 'paper trails' as a means of 'retribution'.

Another aspect of the leadership role where C7, like other executives, has found a use for the PC is delegation.

> 'I'm very for delegation. If there is something that someone else can do and it's a challenge for them, they'll get it ... What I do feel bad about is delegating when it's drudgery, and to an extent I do some of that myself just to assuage my own sort of guilt. But if it's something someone else can do possibly better than me I just push it (their) way.'

He feels his personal assistant is better than him at using graphics software and so lets her do complete presentations for him. One could argue that he should do them himself as he is a fairly experienced user, although this is one area where his expertise with the PC has declined. For him this represents a form of both delegation and training for his subordinate, and a way of making her job 'more interesting', and these are all part of the leadership role. Nonetheless, he spoke of the 'delegation dilemma' (Mintzberg, 1989, p. 50).

> 'There's an insidious problem in that if you can do it yourself there's always the management problem of "I'll do it myself because I can do it quicker", and then you end up doing it every week because it's always going to be quicker than giving it to someone else.'

Mintzberg (1989) coined the term 'delegation dilemma' to explain the general management dilemma which occurs because so much of the information that managers use to accomplish a task is held in their heads often in a random unstructured form which makes it hard for them to extemporise it to others. However, if they do not delegate, clearly they can become very overloaded. One of the inhibiting factors which many executives cited was the lack of adequate instructions on how to use the PC. Given that most were self taught, as shown in Chapter 6, it is little wonder that those who became quite proficient, experienced the 'delegation dilemma' when it came to handing over computer knowledge.

C7 did not talk much about the informational roles other than as a spokesman (in an internal capacity), and in this case, as indicated, his personal assistant prepared his slides. He is undoubtedly acting as disseminator through internal memos, and to some extent by the way he uses the computer he is communicating what Mintzberg (1973, p. 72) calls 'value information'. He uses his electronic personal organiser for diary management and in particular setting call-backs, which could also be interpreted as part of both his liaison and spokesman roles.

Perhaps not surprisingly, given his overall job, C7 talked quite extensively about the decisional role and how he uses spreadsheets to support his work, as shown in Map 7.10 and alluded to in the excerpts in Chapter 6. For example, when he is making a decision either about an acquisition or future strategy:

> 'I've got a PC and a printer at home and (it's) absolutely invaluable, absolutely. The peaceful working environment is just really really good. ... I get to the point where I think

if I don't write the strategic plan this week we're going to have a big problem. I go home and write a draft of it. I'll spend three days at home and bash my way through it, and there'll be like five or six versions by the time I've finished. Sometimes on acquisitions, I just have to have a morning where I can actually look at it and say what are the problems that we haven't seen yet? Maybe come up with nothing, but just fiddle around and poke around until I'm comfortable with it.'

'It's not a decision based on a lot of data, it's like the acquisition which I'm working (on at the moment). If I get it wrong it'll end up wrong. My point of view is to say - "this acquisition is a good one for the company you ought to do this" - and then go and negotiate it. I often try and not place reliance on modelling unless I can counter-check it with something else. So I end up using it as a sort of - "I think this is what it looks like" - and then applying a reasonableness check to it to try to verify the results, which are normally not PC-based.'

(The acquisition model will usually be built by someone else, although C7 will specify the structure of the model he wants.) For the acquisitions he is using the PC to support him in both the entrepreneur and negotiating role, whilst the strategy development is probably more akin to that of resource allocator.

The benefits C7 feels he obtains from his personal use of the PC are encapsulated in his comment 'turnaround, presentation the discipline of doing it yourself and therefore thinking things through before you do them.' Turnaround relates to the category of benefits labelled 'improving personal productivity' (Map 7.2) and the associated concepts of 'self-sufficiency' and 'maintaining the momentum'.

'If I want to do something, I want to do it and get it done and then get on to the next thing. I don't want to have, you know, to write a memo, go outside, come back, check it, another typo, send it back, come back, I'll change it now because actually time's gone on. Five desksets instead of one. Its just a waste of time, and you end up with a whole folder of things to sign at the end of the day which, just drives me mad. Needless administration. That turnaround ability is just great. It makes me feel good about everything else, because then I can give Anne (his personal assistant) really interesting things to do, and to the extent that she is asking for things to do.'

Here emerges the benefits concept of 'enabling the secretary to be more of a personal assistant', which is counteracted with the drawback category (Map 7.7) labelled 'implications for the secretary's job'. Several executives who use the PC like C7 spoke of the need to move away from the traditional view of the secretary

as one of typist and organiser of the executive's day-to-day life to more of a personal assistant working with him rather than for him, and able to use a wide range of software. The executives in this study felt that they had too many secretaries schooled in the old role model rather than the new one, and that many of the former were either unable or unwilling to change. The executive is faced with the problem of having a secretary who does not meet his needs, as exemplified by this comment from L3.

> 'I would like to interact more with the post (e-mail), but there is this problem, that Jill (his secretary) sifts the post and sees this is an important function, and I'm cutting her out if she doesn't (send/receive my e-mails). So that is the more difficult part of it for me ... interacting with my secretary.'

In at least three cases (including C7 and E4) the executive had brought in a new secretary (the old one either being transferred to another manager or made redundant). Others, like L3 and D10, were contemplating what to do. The other benefits C7 derives from his use of the PC relate to his use to support the decisional aspects of his job, as illustrated in this analysis and summarised in Map 7.10, and relate to the categories of 'being more flexible' (Map 7.3), 'enhancing the thinking process' (Map 7.4) and 'making better decisions' (Map 7.6).

The drawbacks C7 perceives, as shown, in the map of his interview (Map 7.10), relate to the drawback categories labelled 'producing senseless information' and 'the pace of technological developments'.

'Producing senseless information.' C7's business is cyclical and during pressure periods he feels that the biggest risk is to do things in too much detail. PCs he feels encourage this behaviour. For him more data and more accuracy do not necessarily mean a better decision. He works on the 80:20 rule, and when he delegates often tells his staff 'you've got to spend no more than 2 hours on the job'. Many executives cited this as a disadvantage, which is akin to what Weick (1985) calls creating senseless information. For example, these excerpts from C2 and H2 highlight the associated concept of 'information overload'.

> 'There is a thin line I think between producing enough to make the business more productive, but also not producing too much to make sure that you spend half your time producing reports rather than reacting to them.'
>
> Executive C2

As H2 said so aptly about her bosses, the board of the holding company:

> 'The amount of information that's expected from Group. ... The information that gets about our company is split so many different ways, that I question the efficacy of some of it. What the hell they use some of it for is beyond me. It just encourages that. It encourages data production rather than information production. ... It's very easy to produce management data as opposed to management information ...'
>
> Executive H2

One executive B1 used the PC to reduce the volume of MIS data.

> '(MIS) produce these nice books of data which are typically 1/4 inch thick which I don't like carrying around, so I take their data every month and spend about 20 minutes a month and put it into my spreadsheets which gives me what I want in about three pages.'
>
> Executive B1

Three of these four executives (B1, C2, C7) have clear preferences for intuition (N) as the dominant cognitive process. For H2 this is her auxiliary process, but it is nonetheless a very clear one. Within the context of her total profile (ENFJ) where the preference for J is slight, intuition (N) could easily be her dominant process.

Allied to this category another drawback for C7 is the associated concept labelled 'shifting the emphasis from the output to the technology' and becoming absorbed in the technology and losing sight of the task in hand '... a lot of showmanship goes into "we've changed from Lotus to whatever ..."; (my) only concern is that the application does 80% of the job, then will find ways to do the other 20% within the constraints of what they have (if they need to)'.

In a similar vein some spoke about seeing the PC and the subsequent output as the consummate option, as illustrated by this comment from C3.

> 'I think the biggest downside is that people tend to regard it (the PC) as the answer, and if you are not careful, they cease to think, they think computer language, but they don't think, (about the actual problem) and you know that has to be the biggest downside, in that their first reaction is they rush to the computer, go and model it and assume that what's come out is actually it, whilst if they try and think a bit more carefully you might not do it that way.'
>
> Executive C3

The map of C7's interview and this analysis have highlighted the links to his perception of his roles, and his personal preference and opinions of certain subjects. In terms of his underlying personality traits, he is an ENTP and has a very clear preference for all but the T for which he has clear preference. There are salient features of his MBTI in these excerpts and especially the intuitive (NT core). For example, he dislikes too much detail, preferring to see the bigger picture and 'poke' around with the data rather than analyse it in detail. This is supported by the other extracts from those with a preference for intuition.

C7 uses his intuition to make his initial decision about an acquisition; only then does he start to investigate the viability in a little more detail. As one might expect form Section 3.17, he seems to use the PC for decision-making more in terms of checking out other options rather than the detailed analysis which an ST might be more inclined towards. The dislike for detail is also reflected in his disdain for audit trails and keeping too much paper. Indeed he commented that he only maintains one filing cabinet which represents 'the 1% of paper work that doesn't get binned' and in terms of financial models.

> 'it doesn't bother me if I over write a model. ... I'll re-think it if it needs to be re-thought. To that extent (the benefit of the PC) is the ability to look at something and change it and have it like new. The last thing I'd want to do is have it, change it, and it either looks an absolute dog's dinner, or I have to re-write it. Or even worse, have to give it to someone else who then gives it back to me, you then have to check it and then put it away.'

ENTPs as leaders are known for encouraging independence and generating enthusiasm, and this comes across in the way he talked about how he is trying to develop his personal assistant, and seeing a benefit of his personal use of the PC as being more self-sufficient. It must be noted that the latter is also clearly a reflection of the organisational culture.

7.4.2.2 D1 (Map 7.11)

D1 is also a Finance Director and in many ways the use D1 makes of the PC is very similar to that of C7, as shown in Map (7.11). He too uses it to support him in the leadership, disseminator and decision-making roles. There are a few aspects about D1 which are nonetheless different and highlight other benefits and drawbacks to executives' personal use of the PC, and it is these contrasts which are discussed in this section. D1 is a steady state user whose use had been predominantly spreadsheets and word processing, and he has an MBTI profile of

ESTJ. He has a very clear preference for the T and J, but only a slight preference for E and S.

The main differences are that D1:

- sees his use of the PC as giving him a 'competitive advantage' over his peers;
- will take work home in the evening and work on it (eg., a report or visual aid) until he is completely satisfied with its appearance (C7 tries not to work at home unless it is instead of being in the office);
- is just starting to teach himself to use graphics software at home.

These reflect variations in personalities and organisational cultures. Organisation D use technology extensively to manufacture their products, as illustrated by this quote in their promotional material: '(we) can draw on a fund of knowledge, technological resource, technical know-how and experience which few, if any, engineering companies can match.' However, they are not very advanced in their use of technology as a management tool. D1 therefore feels his personal expertise with the PC, which he developed with his previous company, puts him ahead of his colleagues.

> 'I think there is a contrast definitely between Company Z and Organisation D, and I think Z (his previous company) were ahead of the game, and had better IT awareness because of that.' He feels today's business culture is forcing managers to learn to use the PC, but that those who can use one now still have a 2 - 3 year head start. 'There is still an opportunity to steal a march on one's peers, for example, with presentations. ... Presentation is all ... It's always nice when you do a good piece of work and it's beyond your expectation, and you think that really looks good, or that really makes the point.'

This in conjunction with the personal competitive advantage may be why he is prepared to work on a report at home until he is satisfied with its appearance even if it means learning some new commands. (When he first learnt to produce colour slides for a presentation he said it took him eight goes and although he admitted he got 'very frustrated' and his language 'got very colourful' he persevered.)

D1's traditionalist (ST) core might make him closed to new ideas (as shown in the case of E1); rather he will adapt his existing skills to a new situation unless he can see a clear justification for changing. Until recently D1 has done all his presentations using either word processing or spreadsheet software. But now he

has decided to learn to use a specialist graphics package. Within these quotes several of the concepts associated with the overall benefit category of 'gaining personal competitive advantage' (Map 7.1) emerge, and in particular, the 'PC skills will be a core competency for the effective managers in the 21st Century', 'differentiating ones-self from one's peers' and 'conveys a more professional image'. One might assume D1 can therefore see a clear advantage in learning to use graphics software to produce better material than in the past and which he uses to support him in the spokesman and disseminator roles. Setting and achieving clearly defined goals is important to ESTJ, and some of this comes across in D1's approach to learning to use the new software.

On the day of the interview he was giving a staff briefing and showed me the slides he had produced, and talked about how he likes to break down the figures so his team can see clearly what is happening. This detailed analysis is in contrast to C7, who prefers the big picture, but is consistent with their differences in core types.

D1 always does the minutes of the directors' meetings, which he sees as giving him control over the content, and the speed and quality of the output 'impresses his boss'. There is in effect a double benefit to him, the category of 'doing things quicker', and again 'gaining personal advantage'. Also, the idea of being in control is congruent with his ESTJ personality.

Last but by no means least there is the category of benefits labelled 'achieving personal satisfaction' (Map 7.5) to which these extracts from D1 point. In particular, there is the associated concept of 'a sense of achievement' once the document is how he wants it to look, and the concepts of 'the intellectual challenge' of achieving that level of presentation, and 'doing something he couldn't do before'. Again these are congruent with his personal disposition as an ESTJ.

As far as the drawbacks are concerned D1's were related to the categories of (Map 7.7):

- 'no critical mass of users';
- 'pace of technological developments';
- 'producing senseless information'.

Whilst he perceives his expertise with the PC puts him ahead of his peers, conversely the lack of a critical mass of peer users also inhibits him from further exploiting the capability of the PC as a management tool (like F1).

Within the category labelled 'the pace of technological development' there were three concepts. First, because he uses only a limited sub-set of the available software's capabilities he feels he may not be using the technology as efficiently as possible .

> 'I think that for every package that I've ever worked on, I probably only know 20% of the package. There's 80% locked away inside that I've never needed to know, therefore I've not bothered. Whereas if I was better I would try and find out how to get the extra benefit.'

There is an element of self-efficacy in this and the previous statement about producing something above his expectation of himself. He said:

> 'I am by no means the expert. ... If I rank myself between computer literate 0 and very literate 10, I'd probably say I was sort of five and a half. Whereas a lot of good people would be 8s or 9s. So I think still I'm fairly low down the range, and I may have given slightly the wrong impression telling you what I've done. It's very easy, what I've done ...'

Several executives made similar statements in terms of almost denigrating their competence with the PC.

> 'I do use them (PCs), in fact use it quite a lot on a personal basis, but I don't think it's anything particularly earth shattering. But then again it may be of interest.'
>
> Executive J3

> '... It was not rocket science, to link from one desk to another, or it shouldn't have been, and you could immediately see the benefits ... sharing a printer, and it saves money ...'
>
> Executive M1

Second, D1 felt it was hard to keep abreast of the technology and so it was easy to become out of date, and to some extent he feels he is fighting a continuous battle to bridge the gap between his competence and the capability of the technology to ensure his skills did not become obsolete. Indeed for those who have become declining users, as shown in Chapter 6, this was a significant barrier to starting to re-use the PC.

Third, there was the concept of 'upgrade costs' (Map 7.7). Whilst D1's managers were always pressing him to upgrade their computers he often found it hard to justify. D1 was not alone in this dilemma, as exemplified in this comment by C4.

> 'You buy one new faster machine for the organisation and everybody who has a machine has to have a new version. In most cases you are dealing with a non-logical (issue). ... It's not a hard dollar and cents cost savings issue. For example, if my financial analyst has a 286 and it takes him an hour to do a task. If he had a 386 it would cut that down significantly. What do I (C4) get? I save you (say) a half an hour three days a week, what do I (C4) get for that extra hour? Why do you have to have this faster machine other than because you want it, and because somebody else has one, and if you don't get one you'll feel left out. How do I get an extra hour and a half's work out of you? You've got an hour and a half less work to do now, so you get to go home early. It helps your quality of life, but doesn't do anything for me.'
>
> Executive C4

Lastly, linked to the category of 'the pace of the technological developments' is the concept that 'more features means more to learn' and finding time to do this was a problem, and for many like D1 it was often done at home.

7.4.3 Advanced Users

The analysis of these four users has shown how the PC can be used to support the whole range of Mintzberg (1973) roles to a greater or lesser extent, and hence some insights into the questions of why and how rather than what. The purpose of the analysis of two advanced users is therefore not to re-cover the uses already discussed, but, as discussed in Section 7.1, to add different perspectives and highlight other benefits and drawbacks and their linkages to executives' *modus operandi*, and in particular the monitor and negotiator roles. The two executives chosen are E4 (Map 7.12) and D10 (Map 7.13).

7.4.3.1 E4 (Map 7.12)

E4 had been promoted to European General Manager for his division about six months prior to the interview. His focus is on stabilising and subsequently growing what has been a declining business for the past few years. He sees his overall job as that of the entrepreneur and new manager and for these jobs Mintzberg (1973) suggests, as shown in Table 3.3, there is an emphasis on the entrepreneur and negotiating roles and liaison and monitor roles.

'I'm trying to drive this business commercially rather than operationally. ... Because of that I'm not here very often. ... You cannot warm the seat. If you do for too long, the business will be manufacturing biased rather than market led.'

'(This) means you have to communicate by electronic mail or by fax. But I can still stay in control because I use those tools. And that's a distinct difference because I think I communicate more when I am away than when I'm here. ... They possibly get more faxes from me when I'm away than when I'm here because I do a lot of my thinking when I'm on a plane or in the evening in the hotel, because you can scribble and put it in your machine.'

For E4 like F1, his use of e-mail supports his disseminator role and enables him to keep in touch and monitor what is happening internally. It also gives him the category of benefits labelled 'being more flexible' (Map 7.3) and the associated concepts of 'being able to work anywhere', 'having all the data to hand regardless of location' and being able to, 'communicate across time and space boundaries'. He feels his use of e-mail has changed how he works with his boss; he sees him less and 'we don't speak that much but we communicate a lot by fax or e-mail'. He also accesses a number of external databases about his clients and his industry to support the external aspect of the monitoring role.

He is often called upon to give presentations, sometimes at short notice, and uses his PC to prepare all his own presentations. There are two benefits for him: first the 'speed' with which he responds to such requests; second, he is able to personalise them to the client, and this he feels gives him a 'personal competitive advantage' in terms of the associated concept of 'putting you ahead of the external competition' (Map 7.1).

'I think that's quite impressive for customers as well, (and) because what I generally do once I've had a meeting with a customer is just send a confirmation fax just thanking them for their time that day.'

In terms of the negotiating role he uses his PC both for internal and external negotiations and sees the main benefit as being able to have a more 'interactive discussion'.

He talked about how he and the accountant (with his calculator) had 'a fun race to see who could make the adjustments (to the budget) quicker! I was sitting there with my spreadsheet and I could make the adjustments and I could think about the adjustments while the accountant was actually making the adjustments. The machine was

doing it. In other words I was thinking while John was doing what the machine was doing. And I thought that was a strategic advantage for me. So computers are an advantage to me because my colleagues don't use them as much as I do.'

As indicated in the discussion of E4, although organisation E, like D, pride themselves on their use of technology to manufacture their products they do not use it extensively as a management tool. This excerpt from E4 highlights several related benefits. First, as in the case of D1 and for the same reasons, there is the overall category of 'gaining personal competitive advantage' (Map 7.1). Second, there is the category of 'making better decisions' (Map 7.6) and specifically the associated concepts of 'interactive discussions' and 'maintaining the momentum', and 'being able to think about the consequences of the action rather than the action itself'. These last two points are illustrated in this extract from L2.

L2, as a government adviser, can be called upon at short notice to deal with the unexpected and found significant value in being able to use the PC to support her in dealing with the crisis, and hence acting as both disturbance handler and to some extent decision maker.

'There was some problem which was greatly exercising him (an MP). ... I had put some submissions in to him which he of course had not read and not absorbed or anything, and he called me in and said I want to know what I can say at this meeting. I want some options. ... I had an hour (during lunch time) to do this. I called in three people and we had half an hour's brain storm and then I wrote him a list of options on my machine, printed three copies out and took them to him. He was incredibly impressed to have not only ideas, but a list of ideas, and typed. It was quite nice, because I feel that if I had had to rely on the secretary or if I had not had typing facilities, I would have spent all that time really worrying about the mechanics (of how to produce the document), whereas most of the time went into actually the thinking.'

Executive L2

In both cases (E4 and L2) one can see them using the PC to create thinking time, whilst using the PC to deal with the more repetitive and mundane aspects of the issue. Hence there is the allied benefit too of 'enhancing the thinking process'.

Many of the ways E4 uses the PC also reflect his personal disposition as an INTJ (Introverted Intuitive) with a clear preference for each dimension. INTJs are the 'most independent of all the sixteen types and take more or less conscious pride in that independence' (Myers and Myers, 1992, p. 114). As a result they are often inclined

to be more task focused than relationship focused and this is consistent with comments he made about himself and his use of the PC: 'I suppose it (my use of the PC) suits my personality to be semi-independent like that.' Mintzberg (1973) suggests that new managers often concentrate on developing relationships. Whilst E4 is doing this with people external to the organisation, it may be at the expense of internal relationships.

> 'You have to have a good relationship with your managers, to have mutual respect that paper communication or electronic communication is acceptable. You have to do that bonding at other times. It has been a culture shock for one or two people. They have said I don't talk to (them) that much. As far as I'm concerned if you don't talk to me you must be doing a good job, because we should be able to communicate effectively by writing two liners or three liners on electronic mail and meeting once a week or once a fortnight. But a lot of people are very uncomfortable with that.'

As discussed in Section 3.17, one might expect him as an I to prefer e-mail to-face to-face communications, and use it whenever he can rather than having a meeting. He is trying to 'drive through' the use of e-mail throughout the organisation. He talked openly about disliking calling meetings; rather, as intimated in the last comment, he prefers to send people information and then discuss it.

Prior to the negotiation, like C7, E4 will use the PC to help him explore the possible options, and 'gain insights into the operations of the business without ever having to walk around the place' and to some extent this comment too may reflect his preference for the internal rather than external world just as much as the fact that he is often away from the office. Whilst he has to spend much of his time with others who are important to the development of the business, such as customers, he has more choice over how he communicates internally, and this may be one reason why he uses the PC more extensively in the internal informational roles.

E4 uses at least six different software packages (including e-mail, word processing, spreadsheets, graphics and external commercially available databases) and is always on the look out for new and different ways to use his PC, which is what might be expected from a visionary (NT).

> '... as my wife said, this is possibly the only husband that takes his laptop into bed. She laughs because I do, that's where I mess around with it. She's reading a book and I'm playing with the laptop.'

For E4 his PC gives him a mobile office '... I don't need to come into the office to get things done, which is a tremendous benefit in terms of quality of time, quality of life' and supports both his perceptions of his job as an executive and certain personal dispositions, as shown in the map of his interview (Map 7.12).

The main drawbacks (Map 7.7) for E4 in terms of how he uses the PC, are the categories of:

- 'no critical mass of users' within the organisation as a whole, as discussed in the previous examples of F1 and D1;
- 'implications for the secretary's job' and the associated concepts that a 'secretary needs to be more PC literate' and a 'secretary needs to be more of a personal assistant' (as highlighted in the analysis of C7's interview).

7.4.3.2 D10 (Map 7.13)

D10 is the Group HR Director and is a growing user, as discussed in Chapter 6. Like C7, D1 and E4 he uses his PC to support him in a number of roles and in particular the leadership, spokesman, negotiator and monitor roles, as shown in Map 7.13. Whilst he perceives a similar wide range of benefits to the other executives, for him a key benefit is the 'intrinsic satisfaction and creativity'.

> 'Probably the end thing is I get an intrinsic satisfaction and creativity out of doing it. ... Self-satisfaction in coming in the last couple of years from a position of slight fear and ignorance, conquering something and then being able to explore and exploit it. I'm not someone who is in freehand artistically creative, but given a set of tools like clip art I can then actually generate, I mean, I have a creative mind, I can decide how to put in humour and all the other things. I quite enjoy writing and being able to express myself and being able to edit in things. So that is something I get quite a lot of benefit from. I find I'm using something which for me there is potentially no limit. The more I go into it the more I find what I can do and want to exploit that.'

This extract highlights a number of the concepts associated with the overall category of benefits labelled 'achieving personal satisfaction' (Map 7.5), and in particular the concepts of 'self-actualisation', a 'sense of achievement', and 'overcoming techno-fear'. D10 is an INTP with a very clear preference for all four dimensions, and so here we see his uses of the PC complementing his natural visionary and creative core cognitive processes.

These benefits are in addition to the harder ones shown in the map of his interview (Map 7.13) such as being able to manipulate data more quickly, make faster decisions, be sure of having the data with him regardless of geographic location. D10 produces all the manpower plans himself. His predecessor did not 'know where to start with a PC' and delegated much of the manpower planning to an assistant who would produced the plans on a computer and 'made it into a black box, magic black box' and form of 'information power'. Consequently a 'huge dependency' was built up around this person. Moreover, D10 felt you could do some of these plans on the 'back of a fag packet'. As a result of his personal competence with the PC and in particular spreadsheets, D10 now personally produces the manpower plans and has subsequently reduced his departmental headcount by one.

For D10 there are three main categories and concepts of drawbacks in addition to those discussed in the previous example, namely the category labelled 'lack of keyboard skills', and the concepts of 'inappropriate use of the PC' and 'lack of compatibility and consistency across different versions of the same software'.

First, 'lack of keyboard skills': '... not having that fluency to be able to do two things. One, to produce things I'm capable of. Secondly, to enable me to progress my knowledge and learning. ... I could produce a lot more based on my existing knowledge if I could move along more quickly and I could therefore maybe free up my secretary to perhaps things that are more important, by saying I could do that. I believe I could exploit the capabilities of the thing (the PC) more completely if I had dexterity.'

At least fifteen executives said they would like be more adept with the keyboard and for some it was more of a drawback, as illustrated by this comment from N1.

> 'I don't type particularly well, so I don't type memos. I don't produce reports. I'm still a bit old fashioned and give dictation to my secretary. To be quite honest it would not be the best use of my time. I'm too busy.'
>
> Executive N1

On balance even those with limited proficiency felt the benefit outweighed the drawbacks, as illustrated by D10's comments, and this one from J3. (At least seven executives (including D10) were teaching themselves keyboard skills using a computer-based training package.)

'(I can) reach a reasonable speed and so from that point of view not only is it as quick to put it on the screen as it is to write it on paper, but it's also much more flexible than a piece of paper would be. That's why I tend to go that route.'

Executive J3

The second significant drawback for D10 was the concept of 'inappropriate use of the PC'. This is not so much about the concepts of producing senseless information as it was for C7 and D1, but about 'being tempted to do things on it which aren't justified, and I'm probably doing it more for the intellectual challenge. If I was rigorous about it I might be saying to myself, I shouldn't be doing this. I should be doing it by hand or perhaps I should give it to somebody else.'

Doing things for the intellectual challenge is entirely consistent with his personality as an INTP. However, satisfying this personal need conflicts with the more rational need to delegate and make effective use of his time. He therefore sees the associated drawback concepts of 'inhibiting delegation' and becoming a PC addict. He is not alone in experiencing the counter-demands, as exemplified by these excerpts from H5 and P1.

'Hang on, I just spent an hour messing around with that, which I wouldn't otherwise have done. Has that hour increased the benefit of what I have produced, or the value of what I've produced by the cost it's taken me to produce? Answer no, waste of my time. I'm getting sucked in here to playing with the keyboard. This is not a good idea.'

Executive H5

'For somebody at my level it's very important that I spend a lot of my time talking with people at a senior level... There is a danger that you can get obsessed by your ability with the machine, and forget that actually at my level the real way you make money is to keep your troops motivated, dynamic, thrusting, competitive, and maintain good relationships with customers. So I do sometimes, on occasions because I want to get something done, which I would normally give to my secretary, I probably do it. By the end of the day I sometimes think I would have been better of if I had spent that day talking to a couple of managing directors rather than just finishing that off because I'm stubborn.'

Executive P1

H5 is an ENTJ and as such one might expect him to be objective and controlled about his use of the PC, yet he too finds himself potentially lured into the drawback of 'inappropriate use of the PC.'

Returning to D10, the third significant drawback is the concept labelled 'lack of compatibility and consistency between different versions of the same software' (Map 7.7). D10's new PC came with the latest version of the organisational standard for word processing, but his secretary and other support staff are still using the previous version, and upgrading their PCs is not something he has control over.

As shown in Map 7.7, there are several other concepts associated with this concept which, whilst not experienced by D10, were encountered by other and are worth touching upon at this point. There are the 'upgrades' and 'more learning' themes, as illustrated in the discussion of D1. It is not uncommon for new versions of software to cause the systems to fail (Strassman, 1990). The concept of 'technology failure' was viewed as a drawback in some cases, especially if the executive himself or his team is heavily dependent on the technology, as illustrated by these comments from F4, L4 and N1.

> 'I get very cross if it doesn't work. You do get very dependent on it, and you get to the state where you're almost paralysed without it. You feel you cannot be bothered to do the thing without it because it's so slow and tedious. ... You can do it actually and it's not that slow, but you feel almost put upon. So it's more an emotional thing than anything else.'
>
> Executive L4

> 'I used to be able to do my job quite easily before I had it (the system), but once you've got it, you then miss it when it's not there, or something goes wrong, or the system's running slow... ' He said he didn't have a temper but does get 'frustrated'.
>
> Executive N1

N1, despite being the MIS director, is a growing low-level user (novice) who later acknowledged that it was not until he started personally to use the computer that he fully appreciated this problem.

F4 has supported F1 and encouraged his department to use the corporate e-mail system as part of his leadership role, but felt that when the system goes it can 'destroy the confidence he had engendered in other executives to use the system and impedes progress'.

Returning to D10, Map 7.13 and this analysis have highlighted other insights in why executives uses their computers which were not so apparent in the previous

analysis, and in particular, the benefits of achieving a high level of personal satisfaction' which is driven in part by his personal disposition towards being creative. In part, as shown in Chapter 6, Section 6.7.4, he was motivated to use the PC by the surrounding organisational norms of his previous organisation, a factor which comes into play less in his current Organisation D. Nonetheless he has continued to develop his competence and use the PC to support him in various roles such as that of leader, monitor, spokesman, resource allocator and negotiator, and overall *modus operandi.*

7.4.4 Executive Travel and the Use of the PC

The analysis of E4's interview showed how he found his use of the PC helpful when he travelled both in terms of supporting specific roles such as the informational ones and generally in terms of supporting his preferred way of working. Other executives who travelled extensively found similar benefits in terms of their overall *modus operandi,* as highlighted by these comments from L5 and P1. L5 advises the government ministers and his team is geographically dispersed within the UK and travels extensively by train.

> 'I find it easier to use a computer than to hand write actually because the train sort of lurches all over the place. Your hand writing is a total mess. Dictating is impossible on a train I find. Typing is both feasible and accurate. The only problem actually is that the tables on trains are too high. Curious thing, I took to travelling second class because they have these things that flap down on the back of seats which are actually much better for typing. If you go in first class you're typing like this, and it's very painful.'
>
> Executive L5

P1 is the European CEO of Organisation P, whose head office is in Australia. As indicated earlier in Chapter 6, he is an expert user, and sees his use of the PC as an integral part of how he operates.

> 'From my point of view it's made both the combination of the life style I choose, but also the life style that I have to have in this industry possible. My business life goes on and it's probably just as efficient whether I'm in the office or not. It's not unknown for me to be away for two solid weeks in a different city every night throughout Europe, but I don't feel out of touch. I can write monthly reports on the train, go back to the hotel, plug in the telephone line, and it's ready to go to Australia.'
>
> Executive P1

However, there were also those who found travel a barrier to making more extensive use of the PC for reasons which related to their perceptions of their roles and the category of drawbacks (Map 7.7) labelled 'travel habits', and the related concepts labelled 'being chauffeured' and 'travel time is for reading'.

7.4.4.1 Being Chauffeured

For example, E5 and M2, both of whom spend much of their time as contact men.

> 'I'm travelling a lot; planes, cars, airport lounges is where I do most of my reading, most of my work. I don't spend too much time in a hotel room to be honest, because if (I'm) travelling I'm trying to talk to as many people as I can.'

> 'I'm in the privileged position in that I get picked up in the mornings to go to the airport. When I come off the plane I get picked up. What happens is my driver gets my mail. So I do my mail (which includes conventional mail and printouts of e-mail) in the car, even if it's six o'clock in the morning or twelve o'clock at night. ... I always like to do my mail in the car. The simple reason is my wife doesn't have a go at me. Now you may say, it's e-mail, you can answer it yourself. But as we agreed not in the car at least at present. We always answer them (memos) with scribbles so we don't raise another memo. That I find very easy to do in the car, and you can get through all of your mail in a few minutes. The e-mail's a good thing, it's good when you are here.'
>
> Executive E5

M2 is also chauffeur-driven wherever he goes, and as the Executive Finance Director of Organisation M is constantly in meetings both internal and external, acting as the figurehead for the organisation.

> 'When I first got the laptop I was playing with it in the back of the car, thinking well I'll do some e-mails. Well, even I had spotted that I needed to be linked in to do e-mail. But why couldn't I, if I wanted to, generate some messages for people which I tend to do writing long-hand; why couldn't I sit in the back of the car, type it out on that (his laptop), and then just plug it in when I got home or to the office, and press a button. The answer is that within the e-mail hardware or software within it, it only works if you are logged in. They say it's easy, what you do is you create all the messages in some memo software, and then you transfer them over when you get to the office, and then you press the button. But that again falls in to the too difficult category.'
>
> Executive M2

Again there is counter-balance between the executive's overall job and operational practices, and his personality. Their MBTIs are ENTJ for E5 and ENFP for M2. Both, therefore, have an intuitive component, although for E5 as an extraverted thinker, despite his visionary (NT) core he may be more inclined to keep with the systems and rules he has established and which work. This is reflected in his comments about how he has always 'done his mail' this way.

M2 is responsible for the MIS and is surrounded by people to whom he can delegate. On the one hand he is, therefore, keen to use e-mail as part of his leadership roles. Furthermore, as an extraverted intuitive he may be inclined towards creative impulses as the acronym for his profile suggests (Everyday New Fantastic Possibilities). Although he is only slightly FP, he is fired up and ready to try out using his laptop, yet the reality of the situation means he cannot achieve what he wants. ENFPs expect their ideas can be implemented as quickly as they conceive them, otherwise they are likely to lose interest. Accessing e-mail in Organisation M is not easy (a fact even their IT Director commented on). Users have several levels of password security to go through before they are in, and as M2 says:

> ' ... frankly it is easier to get Jane (his secretary) to run off the e-mails on a bit of paper. I then scribble replies on them and photocopy them back ... As and when the computer is easier I think people will use it. It's got easier, undoubtedly ... It's just that one comes in in a hurry, these are trivial aspects. If I don't use it for three or four weeks, I then have trouble remembering what my password is.'
>
> ' ... I keep coming back to the fact that my life's working perfectly soundly without it, so why should I make the effort. This is about the third time I've said this conversation. Why should I make the effort which is going to cost me time?'
>
> Executive M2

M2's slight preference for the FP means he could just as easily be an ENTJ like E5 and hence slip back into using his trusty tried and tested system. The net result of M2's overall *modus operandi* and the external factors, such as the difficult user interface, is that although he has tried to use e-mail, he has given up and is essentially a non-user in the work environment. Interestingly, he uses an Apple Mac at home for correspondence and to prepare the annual family budget, so he is not entirely a non-user. However, in the work situation there appears to be just no synergy between how he operates as a senior executive, his personal disposition, and the available technology within the organisation.

7.4.4.2 Travel Time is for Reading

For others whose job was more akin to the expert manager, such as C3 and M3, travelling time was when they could catch up on any work-related reading. In some cases the spokesman role can be more like that of an expert manager, especially when it is emphasised with the monitor role. As in the case of the real time manager, as discussed in Section 7.4.1.1, this job is similar to Herriot and Pemberton's (1995) 'professional manager' (Table 3.5) whose strength is not so much their know-how as their possession of theory-based knowledge which can be applied to solve particular problems. Stewart (1967) called this sort of manager the 'writer' as their job often involves far more paper work than other types of manager. In the context of the expert manager such an executive may be required to maintain their functional expertise.

> '... the main reason is quite simply that I use my train time to read. The amount of different things that the company is involved in require an enormous amount of reading that is coming from all over the place. ... we don't have people in this organisation who do nothing themselves, and only go to meetings. We actually all do things, and I'm ultimately responsible for our Treasury Department, and if there is something going on over there I actually read all the documentation. I don't study it in the level of detail I might have done seven years ago, or five years ago because we've got very competent people I can rely on. But there's a lot of reading and if I didn't use the forty five minutes, each way on the train to actually get through some of the reading and work out who needs to know about things, and re-draft things or whatever, then you know, I just wouldn't actually get through everything. So there's no point in me having a laptop that I can sit and do things on when all I'm probably reducing is the amount of work my secretary has to do, when actually the problem is to try and reduce the amount of work I have to do.'
>
> Executive C3

C3 is very positive about the role of the PC and will use it, and gain some satisfaction from doing so.

> '... when I get a new job, (as a) non-executive (director), and something is troubling me I just sit down and take the board information and model it. And I enjoy that, because I want to prove that I understand how something is working.'

> 'It's very satisfying to actually have a project to do something. There are very few things that you actually do which you can put a box around and say there's an end point to.

> And the nice thing about sitting in front of a computer and doing something is that actually you do a spreadsheet, and at the end of it if you've got it, right there's an end-point, and it's sitting there and you can use it again.'
>
> Executive C3

Whilst C2 is called upon to play the role of disturbance handler as a result of his implicit figurehead role he rarely sees resulting action through to the end. There is C3's MBTI at play too in that, being an introvert, escaping from the public eye would also appeal to him. Others, such as M7 (ISTJ), as indicated in Section 6.7.4, made a similar comment about 'achieving personal satisfaction' from completing a project in the form of building a spreadsheet.

C2 talked about the benefits he hoped to accrue from a recent installation of groupware, and is a born again user. Despite his positive behavioural intentions as a born again user and positive attitude towards this, the nature of his job is acting as a strong deterrent and moderating his behavioural intentions. Others too spoke about the need to keep up to date with matters relating to their functional position and especially those in finance, for example, M3:

> '... I tend to find that one of the things I quite like when I travel, is being able to take some documents that I haven't read over here and I can read them at my leisure, because you don't actually get interrupted by phones or anything else.'

> He also finds it easier with financial reports to 'read from the paper than on the screen. Whereas if I'm at home and I want to, for instance, look at a picture of a work of art, I want to tour the national Gallery for instance, I can pick up one of the lads' CD-ROMs and go through that. Now that, actually, I find quite useful and quite exciting, because it's an easy way through things. It's visual. But the sort of things we are looking at (in the office), there's a multitude of numbers ... and somehow it's easier to flick open that (the paper report).'
>
> Executive M3

M3 is a declining user, as discussed in Section 6.7.2, mainly through pressure of work, although he has retained his interest in the PC at home. In the work environment, like C3, he plays the role of expert manager and uses his travelling time to keep abreast of both functional and general organisational information. M3 is an ENTP and again one sees the counterbalance of his personality in terms of his preference to 'flick through' and gain the big picture, which reflects his preferred cognitive style (intuition (N)), and the demands of his managerial role,

as the expert manager being 'bombarded with information', and the style organisational life, for like E4 and M2 he has a chauffeur who has the mail bag.

7.4.5 Managerial Use of the Computer and the MBTI

The primary purpose of the MBTI data was to aid the interpretation of the interview data in terms of aspects of the executives' personalities which might not otherwise be visible during the interview. Nonetheless, based on the literature it was thought some clear statistically significant trends might emerge, as discussed in Section 3.17.3.

Table 7.2 shows the distribution of e-mail users in terms of their preference for E or I, for those executives where the use of e-mail was discretionary rather than the organisational norm (as in the case of Organisations H and J).

Table 7.2 E-mail and the Preference for Extraversion and Introversion

Preference for E or I	Number using e-mail	Number not using e-mail	Total
E	18 (= 75% of Es)	6 (= 25% of Es)	24
I	13 (= 68% of Is)	6 (= 32% of Is)	19
Total	31	12	43

Interestingly, a slightly higher percentage of Es chose to use e-mail than Is. Use, in this context, is taken to mean interact directly as opposed to having someone print out the e-mails and then deal with the paper versions. In terms of overall use of the computer, Table 7.3 shows the comparison of core types and use for the total sample. Superficially it looks as if the NTs make more extensive use of the computer which is as speculated. However the cell populations are too small for a chi-square test of significance to be calculated. Table 7.4 shows a comparison of low users to medium and advanced level users.

Table 7.3 MBTI Core Types and Overall Use of The Computer

Core Type	Non-Users	Low Users	Medium Users	Advanced Users	Total
ST	4 (= 57%)	5 (= 36%)	8 (=26%)	6 (= 33%)	23
NT	3 (= 43%)	9 (= 64%)	22 (= 73%)	12 (= 67%)	46
Total	7	14	30	18	69

Note: % represents the % of the core type for that group of user

Table 7.4 MBTI Core Types and Low, Medium and Advanced Users

Core Type	Low Users	Medium and Advanced Users	Total
ST	5 (= 26%)	14 (= 74%)	19
NT	9 (= 21%)	34 (= 79%)	43
Totals	14	48	62

Note: % is related to the total for the core type

Again superficially it looks as if the NTs make marginally more extensive use of the computer than the STs. However, a chi-square calculation gives a value of 0.22 which is not significant at the 5% level, and suggests that there is no statistical evidence for such a relationship. This supports the interpretation of the interview data in that whilst some STs were entrenched in behaviours they had developed over many years and by and large made minimal use of the PC, as illustrated by the analysis of E1 and comments from N1, others such as D1 and M1 had changed their way of doing things in order to accommodate the potential of the PC, and made quite extensive of it.

It had also been speculated that the STs would use a narrower range of software than the NTs (the STs perhaps being more inclined to adapt their knowledge of how, what and where as the NTs would be more prone to knowing beyond and try out new software). Table 7.5 shows the distribution in terms of core types and range of software used (excluding the obligatory use of e-mail).

Table 7.5 MBTI Core Types and Range of Software

Core Type	1 - 3 Packages	4 or more Packages	Total
ST	25 (= 63%)	15 (= 37%)	40
NT	13 (= 68%)	6 (= 32%)	19
Total	38	21	59

Note: % is related to the total for the core type

In this case, again, the results are counter to expectations. The chi-square value was calculated as 2.33 which is not significant at the 5% level, and suggests that there is no statistical evidence for the relationship. From the detailed interpretation and analysis of the interview data there was some evidence of more specific behaviours with respect to the way in which the executives used the computer and in particular those:

- whose core is ST can often be seen to use the PC to support their preference for dealing with the here and now and accomplishing the task in hand as efficiently and effectively as possible, for example D1 and M1.

- who have either a visionary (NT) or catalyst (NF) core often use the PC to support their drive for creativity and a sense of knowing beyond, for example as shown by those who use the PC to incubate their thought processes, by taking the source data and re-modelling it or develop a strategy paper (B1, C1, C7, E3, G3, H2, J3 and L5), and prepare their own presentations (D10, E2, K1, L4 and L5).

However, there are also those with a preference for intuitive cognitive processes, having an NT and NF core, who found the PC offered few perceived benefits, such as B5, C4, L1 and M4, and as such their use of the PC had declined. This point is exemplified by a contrast between M2 and B1 who are ENFPs. This is an unusual profile both in general and specifically for senior executives in general. Myers and Myers (1992), Nutt (1993) and Gardner and Martinko (1996) found that in general less than 10% of senior managers have this profile. B1 is American and M2 is British. Both are called upon to play similar roles, for example that of leader, figurehead, spokesman, monitor and negotiator, and can call upon significant resources to undertake work for them.

B1 is a steady state expert user who uses the PC to support him in whatever role he is playing, be it leader, figurehead or spokesman, and is continually looking for new ways to exploit the PC. M2 has seen the attraction of the PC and as indicated made an attempt to use it but gave up. There are several visible differences between these two. B1 has spent his working life dealing with 'intelligent devices', ie., computers of one sort or another. M2 on the other hand had by and large achieved a very senior position without ever really having to use one, although he does use the Apple Mac which he has at home. Martin (1988) and Thompson et *al.*, (1994) found that there was some form of positive relationship between previous computer experience and use. The strengths of their MBTI profiles are different: B1's preferences for these attributes are strong, whereas M2 shows only a weak to slight preference for all four attributes. Their working habits are different, B1 by and large taking himself from place to place, and M2 being chauffeured. As indicated, the e-mail system in Organisation M is acknowledged to be hard to use. Last and by no means least they have different national cultural backgrounds - a factor which can make a difference both in

general terms (Hofstede, 1991) and specifically with respect to the PC usage (Igbaria *et al.*, 1995a; Igbaria and Zviran, 1996).

Despite the seemingly equivocal results from the MBTI core type, the data from the individual profiles did provide extra insights into the executive as an individual and was felt to be useful with respect to interpreting how and why they used the computer and the benefits they derived from their use.

7.5 Discussion and Summary

The results from the analysis of this portion of the data revealed a wide range of tasks for which the executives in this study were using the computer and especially the PC, as summarised in Table 7.1. In many cases the executive is using the computer both as a personal productivity tool, and to establish the role model in terms of the organisational culture he wants to create with respect to the use of information technology. This chapter has also shown how executives' personal use of the computer is related to the context within which they operate as senior managers in terms of their perceptions of the jobs and roles and life styles, and their personal Jungian attributes and dispositions. The detailed analysis of six interviews has provided some insights into the question of why executives choose to use the computer in the manner they do. These results are summarised and reviewed in this section under four headings:

- managerial roles and processes;
- benefits;
- drawbacks;
- MBTI profiles.

7.5.1 Managerial Roles and Processes

The overall analysis of all the users' interviews (regardless of level of use) showed these executives to be using the computer to support them in one or more of the management roles identified by Mintzberg (1973), as summarised in Table 7.6. To some extent this is contrary to his axiom that given the nature of executive work the computer has no place. However, his stance is one of seeing the key managerial role as one of information processing related to decision-making and particularly that of strategic planning. Whilst there is no denying this is an important part of the senior executive's job, they are called upon to play

other roles, such as figurehead, spokesman and negotiator, and for some these roles can assume a large part of their working day.

Moreover, at the time Mintzberg (1973) wrote his treatise the computer was far less accessible to the executive with no professional MIS training. Much of the previous research has been on the use of the computer and in particular mainframe DSS, MIS and EIS systems to support the pure decisional roles, as discussed in Chapters 2 and 3. This study has shown that there is a place for the computer as a support and adjunct to the other roles such as the interpersonal and communications roles.

Table 7.6 Managerial Roles and the Use of the PC

Role	Examples of Use of PC for Support
Figurehead	Preparing and giving presentations, diary reminders about who needs a phone call
Leadership	Dealing directly with e-mail and internal correspondence, preparing strategy papers, delegating PC-related tasks as a way of developing subordinates
Liaison	Contact and diary management
Monitor	What-if modelling, searching internal and external databases, developing strategy
Disseminator	Dealing directly with e-mail, preparing presentations, project monitoring (sometimes via the reminder facilities within an e-mail system)
Spokesman	Preparing presentations (written and visual)
Entrepreneur	Developing strategy, what-if modelling, scanning internal MIS data
Disturbance handler	PC used to compensate for the fragmented day, for example by enabling executives to deal with e-mail in the gaps, or provide a rare opportunity to complete a task for themselves
Resource allocator	Data analysis and manipulation, document preparations, time and diary management
Negotiator	Data analysis and manipulation to facilitate more objective negotiation

Many authors on the nature of managerial work (and in particular Isenberg, (1984); Mintzberg (1973; 1989); Weick (1983; 1985)) have stressed the importance of mental models and the need to think. As shown in these analyses, executives spoke about how they perceived their use of the PC as 'enhancing the thinking process' (Map 7.4), whether as part of a decisional or an informational role. The excerpts from B1, C1, C7, G3, E4 and F1 showed how the PC can be used to support five of Weick's (1985) sensemaking processes, those of - 'effectuating', 'triangulation', 'incubating', 'deliberating' and 'consolidation' (as discussed in Section 3.8.1). Isenberg (1984), as discussed in Section 3.8.2, specifically proposed that mapping issues in different ways to understand the more complex problems was an area where executives should be using the PC to improve their thinking processes. There was evidence in these analyses that some executives were using the PC in this way.

He also posited that executives should use computers to deal with the routine aspects of their work so as to free themselves to think about the more strategic aspects of problem solving. The excerpts from E4 and L2 showed them using the PC in this way, and especially E4 in his negotiations with the accountant.

Related to Isenberg's (1984) and Weick's (1983) propositions about managerial thinking, is Kotter's (1982) of pursuing the hidden agenda. There was evidence that in some cases the executives were using the PC to support this process, for example by modelling data to look for trends related to an idea they were exploring, as highlighted by comments from C1 in Chapter 6; preparing documents related to new strategies they wanted to implement, as illustrated by F1's and G3's comments and making personal use of the computer to initiate and reinforce aspects of the organisation culture they were trying to establish, as seen in the comments from F1, C7, E5 and D10.

In some cases there is evidence that the use of the PC has changed the *modus operandi* of these executives. This is in contrast to Martin's (1988) findings, and this may reflect primarily a difference in focus. Martin's (1988) study was concerned primarily with executive's use of DSS rather than the wider range of personal productivity tools as studied here. The most significant change was in how the executives were able to change the relationship between themselves and their secretaries, and develop more of a partnership relationship, with the secretary becoming more of a personal assistant with whom they worked rather than someone who worked for them. The other significant way in which the use of the PC has affected how these executives work was in enabling them to be

more responsive and flexible to demands of not only the internal and the external business environment, but also their home lives. (The last point was not explicitly mentioned in the extracts cited in this chapter, although P1 and E4 alluded to it, and some such as H2 and M9, as cited in Chapter 6, made direct reference to how they were able to work from home when circumstances dictated.)

The evidence from the results of this study about how executives personally use computers and the resulting value to them lends support to the findings of previous authors, and in particular Boone (1991); Martin (1989); McKinnon and Bruns (1992); Rockart and DeLong (1988) and suggestions of how the computer could support executives (such as Applegate *et al.*, 1988; Davidow and Malone, 1992; Isenberg, 1984; Leavitt and Whisler, 1958).

7.5.2 Benefits Derived from Personal Use of the Computer

The benefits these executives perceived they obtained from their personal use of the computer were found to fall in to six main categories and associated concepts, as shown in Maps 7.1 to 7.6. The results in terms of these categories of benefits are reviewed in this section.

7.5.2.1 Gaining Personal Competitive Advantage - Map 7.1

For those for whom the contact role is a central role, especially in terms of meeting customers, the use of the PC allows them to gain an advantage over the competition and convey a more professional image. From an internal perspective, too, there were benefits to be gained, as shown in the analysis of D1 and E4's interviews. For some, such as M7, as shown in the Section 6.7.2, their personal use enabled them to progress their career ahead of their colleagues.

7.5.2.2 Improving Personal Productivity - Map 7.2

A number of ways have been explicated in which executives are using the PC to support them in all three of the main role sets (interpersonal, informational and decisional). How and why these executives use the PC, as they do undoubtedly, also reflects three other external factors (of the sort outlined by Handy (1989; 1994) and Kanter (1993) as discussed in Section 3.11). First, as indicated in the past five years, the technology has become so much more accessible to non-professional MIS users such as the senior executive. Tasks such as preparing

speeches, reports and visual aids would probably have been unthinkable for all but the most expert end-user some five to ten years ago.

Second, there is the continual pressure on large organisations to become more profitable and in turn leaner and meaner. This in turn has encouraged executives to look at how they use their available resources, which includes both their own time and that of their support staff. (This was explicitly shown in the analysis of D10 who was able to reduce his headcount as a consequence of his personal competence with the PC.) In this context too one is seeing those who play a leadership and figurehead role use the computer to establish the organisational culture.

7.5.2.3 Being More Flexible - Map 7.3

As organisations become more global, executives are finding themselves faced with the need both to communicate across different time zones, and travel more extensively. Thus in the former case e-mail is seen as a useful supporting tool. In the latter case, for some the PC can be used to maintain contact, use what might otherwise be dead time, and ensure that they have all the information they need regardless of location. Hence one sees the degree to which the PC is perceived as enhancing personal productivity, depending on the executives' preferred personal managerial style, their managerial role and their working life-style (such as having a chauffeur). For some, too, where there is a need to work more across different time and space zones there is this category of benefits of 'being more flexible'. Here again there was evidence of the PC being used to support the range of managerial activities and tasks and provide the executives with such benefits.

Several authors have found that senior executives prefer verbal to electronic means of communications as they are seen to be richer in content (for example, Trevino *et al.*, 1990; Fulk *et al.*, 1990; Mintzberg, 1973; Kotter, 1982; Stewart, 1967; Swanson, 1987b). Most of these studies have focused on the decision-making role and suggested that because of the perception of e-mail as a lean communications medium, plus their poor typing skills, executives will not become extensive users of e-mail. More recently, Markus (1994) and others such as Fulk and DeSanctis (1995) have found that executives are making more extensive use of it as a communications medium as the technology of e-mail improves (and in particular the user interface), and the concept becomes more widely available and accepted as the norm within organisations.

The nature of the messages for which the executives in this study used e-mail was not investigated in depth. However, these quotes and the overall number of executives who chose to deal with their own e-mail, as shown in Table 7.2, support the findings of Markus (1994) and Fulk and DeSanctis (1995). These comments, and in particular those of F1 (and others in Chapter 6), suggest that where an executive finds e-mail suits his managerial style and is relatively easy to use he will be disposed to interact personally with it, rather than through an intermediary such as a secretary. Nonetheless as seen in the quotes from G3, E5, M2 and M9, some may choose not to interact directly with this medium perhaps because it does not fit into their way of working, the system may be hard to use, and they may simply dislike the use of e-mail.

A few executives had started to use e-mail as a form of groupware, as witnessed by the manner in which F1 prepared a recent strategy document, namely by using e-mail as the main medium for circulation and commenting on the document. On the basis of much flaunted benefits of groupware and the concepts of the networked organisation (Fulk and DeSanctis, 1995; Gates, 1995; Shearmon and Huckle, 1994) one might have expected to see more executives working in this way. One reason for the very few instances of such group-working may just be that most of the published cases of group-working are still embryonic and often confined to specific parts of an organisation rather than being organisation-wide. Five organisations (C, G, H, J and Q) talked about pilot studies being undertaken with a view to implementing groupware on an organisation-wide basis. However, these were the only organisations in which there was specific reference to groupware.

7.5.2.4 Enhancing the Thinking Process - Map 7.4

As discussed in detail in Section 7.5.1, executives were using the computer to support their thinking processes, and in particular found it helped them crystallise their thoughts, and improve their decision-making. Also in some cases, such as E2, their use of the computer to support their thinking processes was compatible with the context within which they operate, for example being very mobile. The benefits derived from how the computer helped enhance the thinking process are also linked to those of 'making better decisions', as discussed in Section 7.5.2.6.

7.5.2.5 Achieving Personal Satisfaction - Map 7.5

The way in which the executives felt they were 'achieving personal satisfaction' from their personal interaction with the PC reflected both the context of their work and their personal dispositions. For example, some spoke of the fragmented nature of their work and how what they did with the PC was probably the only task they personally completed, be that modelling some accounts as part of a decisional role or preparing a speech as part of either an interpersonal or informational role. For some, the sense of satisfaction was far more related to their personal values such as a need to achieve goals and self-actualise as seen in the excerpts from D1 and D10. For others, such as F1, it was also about helping them pursue their agenda for the corporation.

7.5.2.6 Making Better Decisions - Map 7.6

Last and by no means least, as one might expect, many executives spoke about how their use of the PC added value and supported the decision-making process and hence perceived the benefit of 'making better decisions'. Research and thinking on the value of the computer for decision-making has been equivocal, as shown in Section 2.11. Again, some of the reasons why executives found their personal interaction with the PC was beneficial may be related both to intrinsic and extrinsic factors.

Taking the intrinsic factors first, Agor (1985) and Isenberg (1984) suggest executives could use the computer to support and hone the creative, intuitive aspect of their decision-making process and there was evidence to support this, for example, from C7 who talked about poking around the data, and C1 and B1 who like to model the data to look for other angles. Conversely, authors such as Weick (1985; 1990b) and Lilley (1992) have expressed concerns that computers and specifically EIS can disable the creative component of the decision-making process, and create senseless information, and there was evidence of this, as shown in excerpts from C2, C7 and H2. Indeed 'producing senseless information' was regarded as a drawback category (Map 7.7). Of the extrinsic factors, there were those of needing to make decisions quicker and often away from the normal work location, and perhaps with fewer resources (people) than before, as expressed, for example, by D10, E4 and P1.

The fact that overall those who use the PC to support the decision-making process found it valuable lends support to the findings of previous authors such

as Rockart and DeLong (1988), Boone (1991) and more recently Vlahos and Ferratt (1995).

7.5.3 Drawbacks

All the users cited at least one of the drawbacks shown in Map 7.7 and in some cases these were seen to inhibit them from making more extensive use of the computer. The most significant drawbacks related to three main categories, of which the first two are in many ways interlinked:

1. 'pace of technological developments' - and in particular the concepts of 'upgrade costs', 'lack of compatibility and consistency between different versions of the same software', and 'lack of consistency across different packages';

2. 'making time to learn to use the PC more effectively' - and in particular the concepts of 'lack of keyboard skills', and 'doing things inefficiently';

3. 'no critical mass of users'.

7.5.3.1 Pace of Technological Developments

Many executives were concerned about the 'lack of consistency and compatibility between different versions of the same software', which resulted from the constant stream of new technological developments, particularly on the software side. The comments from D10, L4 and N1 highlight some of the problems encountered within the office environment. In some instances, too, executives who were used to doing some work at home would suddenly find that their software was no longer compatible with the office version. This was particularly the case where the organisation had upgraded to an icon driven version of the software (eg., Windows) but the executive had remained a command driven user. Whilst the executives could take work from home and use it on the office software the reverse could not be done, as software is usually only upwards compatible. They were then faced with re-learning, and 'making time to learn'.

For others, as indicated in the comments by C4 and F4, the drawback was not so much related to their personal use, but rather their roles as figureheads. Their concerns were not just about the more obvious cost of the new technology, be it

software or hardware, but all the hidden costs of retraining, down time when new versions fell over, and consistency and compatibility.

A recent survey by the Gartner Group (1995) showed that it cost about £4,500 per year to maintain a desktop computer, whilst one by the OTR Group (1995) showed that only about 10% of users gained any benefit from software upgrades. At least ten executives in this study talked about the cost of upgrading and some felt they were quite hard pressed to justify these costs, as exemplified by the quotes from D1 and C4. In other cases the executives were equivocal about the cost justification of their own use, as illustrated by the comments from D10 and H5.

7.5.3.2 Making Time to Learn to Use the PC More Effectively

Many felt that the 'pace of technological developments' is such that it is hard to keep current, as highlighted by the quotes from D1. Consequently, with the continual flow of new features they felt they were fighting a constant battle to bridge the gap between their competence and the capacity of the computer. For all levels of user, both keeping pace with the new versions of the software and infrequent use of a particular application can, as one might expect, lead to skills loss. The value of practice when learning a new skill in general has long since been acknowledged, as the effect of skills loss when that skill is not used (Annett, 1991; Newell and Rosenbloom, 1981; Stammers and Patrick, 1975), and the computer is no exception (Card *et al.*, 1983) especially when one is an 'intermittent user' (Santhanam and Wiedenbeck, 1991).

At least fifteen executives who were quite comfortable using DOS spoke about how they had kept away from Windows for as long as possible because they felt it would mean 'making time to learn to use the PC' and hence traverse the learning curve again.

There is also an element of self-efficacy (Bandura, 1977) whereby the executive felt inferior to others who make more extensive use, as shown in the previous comments by D1, J3 and M1. Compeau and Higgins (1995a; 1995b) and Igbaria and Iivari (1995) amongst others have found self-efficacy can moderate the extent and level of use of the PC. Indeed this quote from J3 was typical of the way many of the interviews commence: 'I do use them (PCs), quite a lot on a personal basis, but I don't think it's anything particularly earth shattering. But then again it may be of interest.' In part there is self-efficacy, and in part these executives are benchmarking

themselves against the professionals and hence being unfair on themselves. Not surprisingly this perception of not being as good as others who are more expert also acted as an inhibitor in that some executives did not have a high level of self-esteem and confidence with respect to their use of the PC.

The concept of 'lack of keyboard skills' has been cited in a previous study (Boone, 1991) as a barrier to use. It was cited here by many but more as a moderator rather than a significant deterrent, at least for those committed to using the computer, regardless of level of use, which is in keeping with Boone's (1991) findings.

7.5.3.3 No Critical Mass of Users

For those where the use of the computer as a management tool was not well established (as in the case of Organisations D, E and F), on the one hand the executive's use might be seen as conferring a benefit to them. Conversely and not surprisingly 'no critical mass of users' was perceived as both a drawback and inhibitor. Nolan (1973) was one of the first to note that if end-user computing was to gain acceptance a critical mass of users was needed. This is in keeping with the general theory of innovation (Rogers and Shoemaker, 1971; Rogers, 1983). Despite the proliferation of desktop computers over the last twenty years, this is still a problem at senior management levels, as other authors, such as Bird (1991; 1992), March and Sproull (1990) and Nelson (1989) have previously noted. In this study of 85 executives, 12% comprised non-users and 24% novice users (Table 6.9). For some, therefore, the different levels of expertise within the organisation meant they felt they could not realise the full potential of either their own or their organisation's investment in personal computing. As D10 commented about the divisional Personnel and HR Directors, who only had a dotted line to him, he felt '... I can't go out and instruct my personnel directors to all get a PC and become literate and therefore all communicate by e-mail. One's got to entice or seduce them that way.'

The pace of technological change and lack of a critical mass of users were the main extrinsic issues which were regarded as significant drawbacks, which is in contrast to the previous findings of those such as Fisher (1992), but consistent with those of Ein-Dor and Segev (1978; 1982). As discussed in Chapter 6, other extrinsic factors, such as the MIS infrastructure and organisational culture, were regarded as barriers to use, in that they could cause executives' use to decline.

7.5.4 The Drawbacks in Perspective to the Benefits

In some cases, these drawbacks acted to moderate the use and benefits the executives obtained, either from their direct personal use of the PC, or the benefits from their indirect use through the use their colleagues made of the PC. However, by and large the drawbacks were merely seen as annoyances and frustrations which were just regarded as part and parcel of using the PC, just like any other piece of technology, such as a car.

Each executive was asked if they foresaw a time when they might relinquish their personal use of the PC. As the quotes from D10, H5 and P1 imply, whilst their use of the PC may convey benefits to these executives, this does not necessarily equate with a cost justification for their personal interaction with the PC. Indeed, as highlighted, there may be times, as C7 found, when it would be more cost effective to delegate and become either an indirect or chauffeured user (Culnan, 1983). None admitted to seeing a time when they would be complete non-users. Their use might decline, but most felt they would remain direct users of one sort or another because on balance they perceived the benefits outweighed the drawbacks, as optimised by these quotes.

> 'I guess I modestly think the way we do things, the way we use PCs, does actually lead to better quality work going out.'
>
> Executive P1

> '... I hesitate to over-sing the virtues (and say), I'd be half as productive or half as useful as I am without my PC. I wouldn't put it in those terms, but it's a useful adjunct to what I do. It's a useful supporting tool to what I do.'
>
> Executive M1

> 'It (e-mail) has been the first time that something has landed that I found has been of real value to me. It must have increased my productivity (although) it would be very hard to pin down.'
>
> Executive F1

7.5.5 The MBTI Data

The personality data from the MBTI profiles has primarily been used to support the interpretation of the rationale for how and why these executives use a PC to support there various managerial roles. No statistically significant relationships

were found with respect to the use of the computer as a management tool and the MBTI core type. Indeed, in the case of the use of e-mail, the results were the reverse of those expected in that a slightly greater percentage of the Es than the Is were users, as shown in Section 7.4.5 and Table 7.2. There may be several explanations for this finding. First and foremost, as shown in the analysis of the interviews, in some cases e-mail is just not compatible with the executive's operational style, as in the case of E5 and M2. Second, as shown in Chapter 6, extreme pressure of work can cause a decline in direct use of the PC, as in the case of M3, M9 and Q4.

Another possible explanation for this unexpected and to some extent counter-intuitive result may be the imbalance between the two main core types of ST and NT. There are more NTs than STs and, as the core dimensions are always the stronger ones, the NTs' potential desire for 'knowing beyond' may draw them towards the computer despite their preference for the internal or external world. Moreover, for some Es such as an ESTJ, the expedient nature of e-mail would be very appealing. (Gardener and Martinko (1990) found similar discrepancies between their expected and actual results where there was an imbalance of styles within the group being studied.)

The fact that no clear statistically significant results emerged is not altogether surprising because, as the interpretation of the interview data has shown, there are several contextual and role related factors which contribute to the executive's choice about how he uses the PC to support him.

To attempt to deduce any further concrete conclusions about the link between the MBTI profile and these executives' use of the PC would be infelicitous for several reasons. With respect to the roles related data, the executives performed diverse roles and tasks. For some, the need to give formal presentations was minimal, and hence regardless of their MBTI profile they may not use the PC in this way. Thus, as shown in this and the previous chapter, the fact that they did not use the PC in a particular manner by no means implies their behaviour was as a result of their preferred cognitive processes.

With respect to the MBTI data, first, the NT core is over-represented. Second, not all the executives' MBTI data was available. Third, as shown in the comparison between M2 and B1, in many cases seemingly similar profiles had different strengths and are therefore not always identical, as Nutt (1993) found. Fourth, as shown by the analysis of these interviews, other significant factors may

intervene, such as extensive previous exposure to computers, as Martin (1988) found.

Nonetheless, within the original confines for which the MBTI profile data were collected, namely to support and refine the interpretation of the interview data, it is felt that the MBTI data have provided some useful additional insights into the executive as an individual.

7.6 Summary

The results in this chapter have shown the variety of ways in which these executives are using the PC to support them in the many roles they are required to perform as senior executives. There is some form of interaction between the choices the manager makes about how he uses the computer to deal with the demands and constraints of his job (Stewart, 1982; 1991) and the managers' underlying and enduring personality traits, as measured by the Myers-Briggs Type Inventory, as the discussions in Sections 7.4.1 to 7.4.5 illustrate.

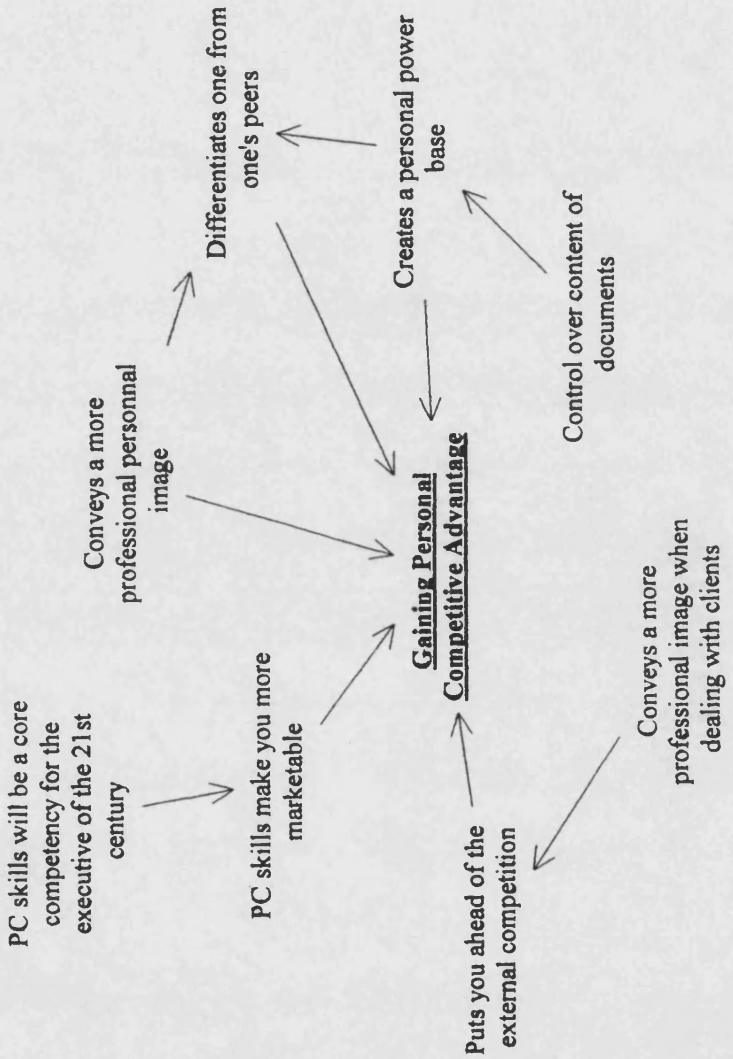
As shown by the cognitive maps (Maps 7.8 to 7.13), the value executives derive from their personal use of the computer appears to be linked to their perceptions of their roles and jobs, the processes they use to execute these roles and jobs, and their underlying personal attributes, as measured by the MBTI. The MBTI data have shown how in some cases these perceptions and processes are either moderated or enhanced by their personalities.

The cognitive maps and analysis of the data from this study suggest that these two dimensions, role perceptions and personality, may be linked. However, it was beyond the boundaries of this research to determine the nature of the linkage. Indeed, there may be other intervening influences which could not be detected during this study, such as the underlying information culture (Davenport *et al.*, 1992).

Nonetheless, these findings lend support to the models of end-user computing discussed in Chapter 2, which are based on both the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and behavioural intentions (BI) (Triandis, 1971; 1979), such as those proposed by Davis *et al.*, (1989) and Igbaria (1990; 1993; 1994) using TRA, and Thompson *et al.*, (1991; 1994) using BI theory. These aspects of the results of this research are discussed in

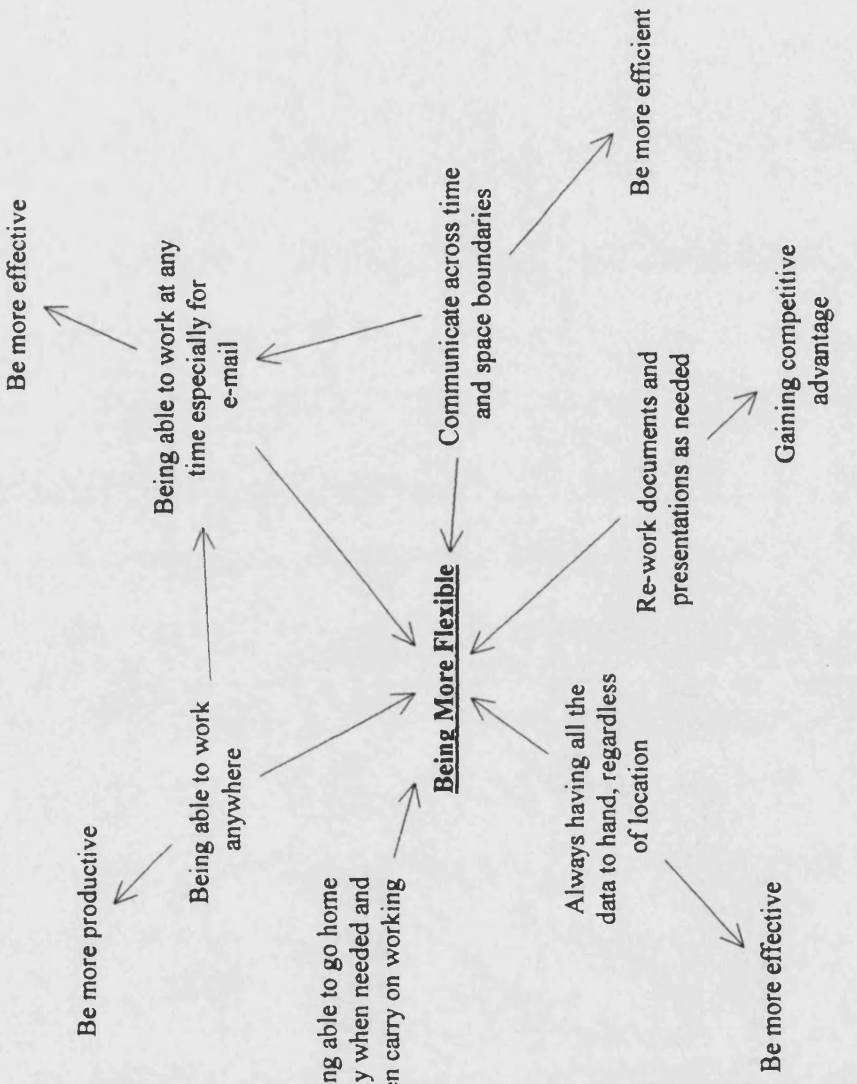
more detail in Chapter 9 where a model of the executive as an end-user is proposed.

Map 7.1 Gaining Personal Competitive Advantage

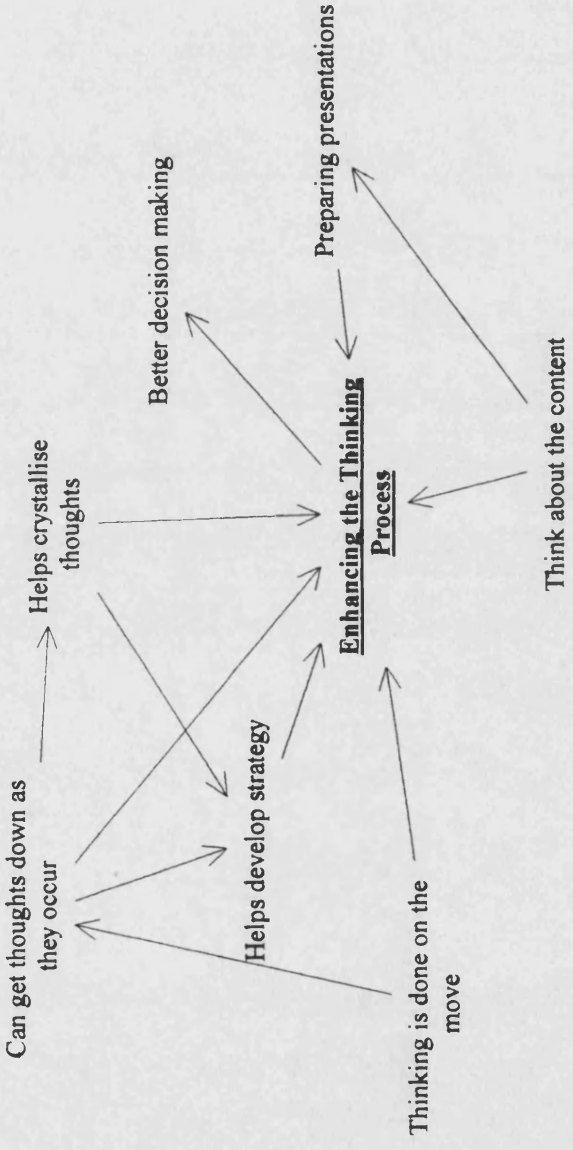


Map 7.2 Improving Personal Productivity

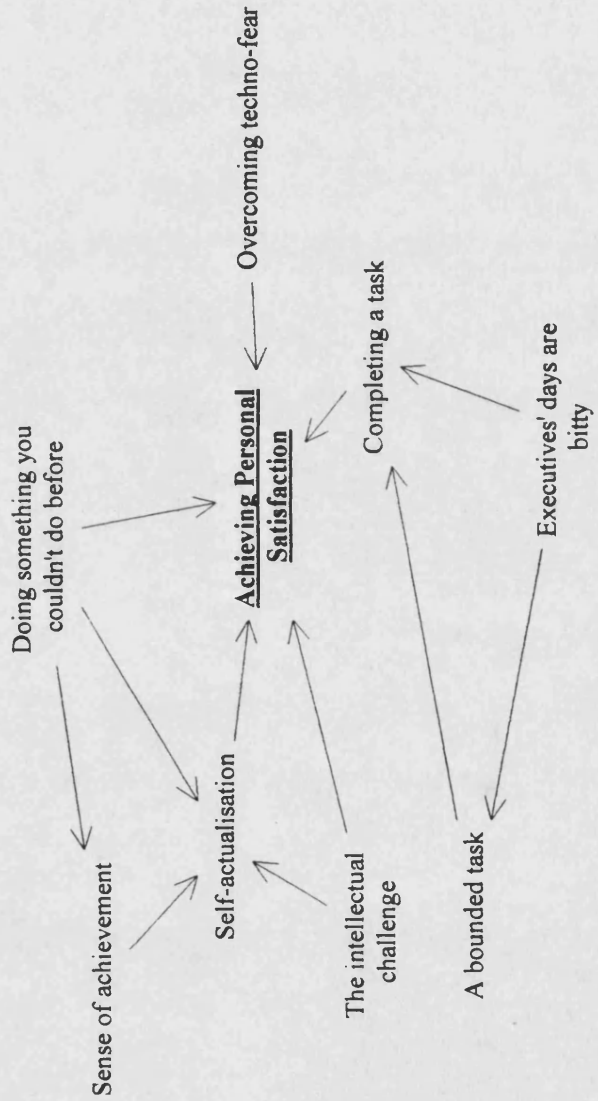
Map 7.3 Being More Flexible

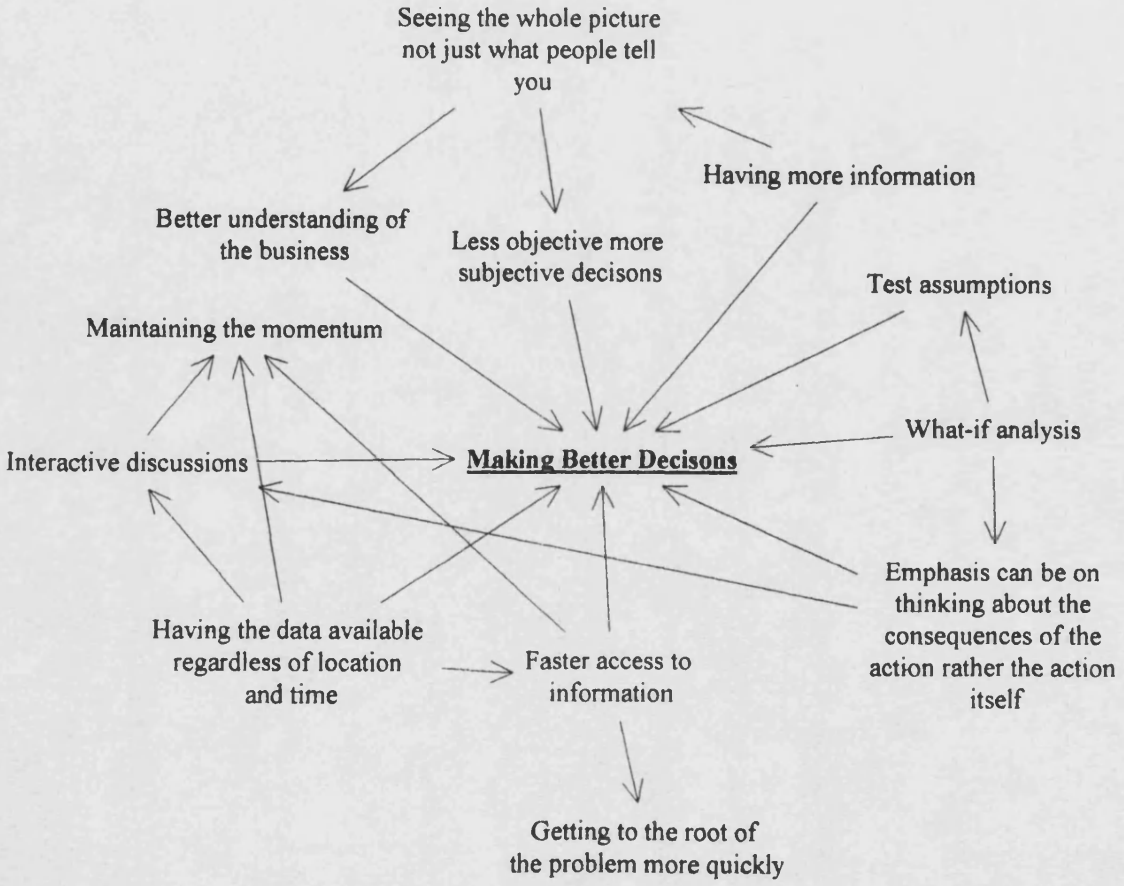


Map 7.4 Enhancing the Thinking Process



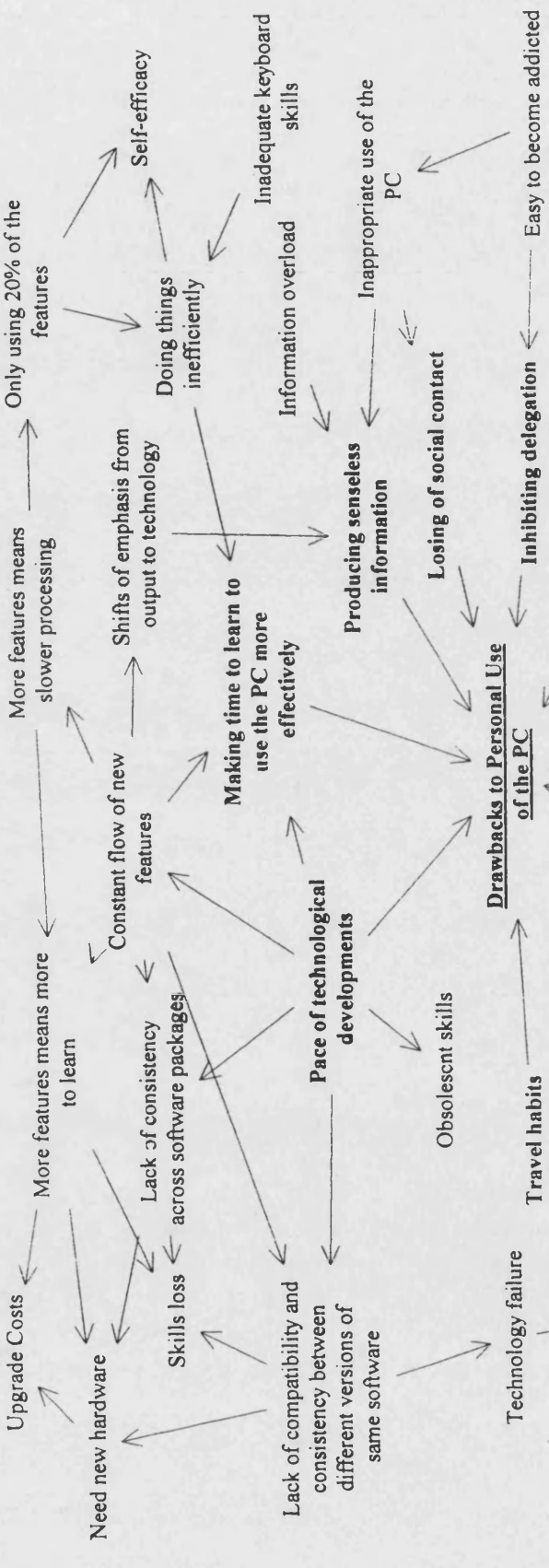
Map 7.5 Achieving Personal Satisfaction

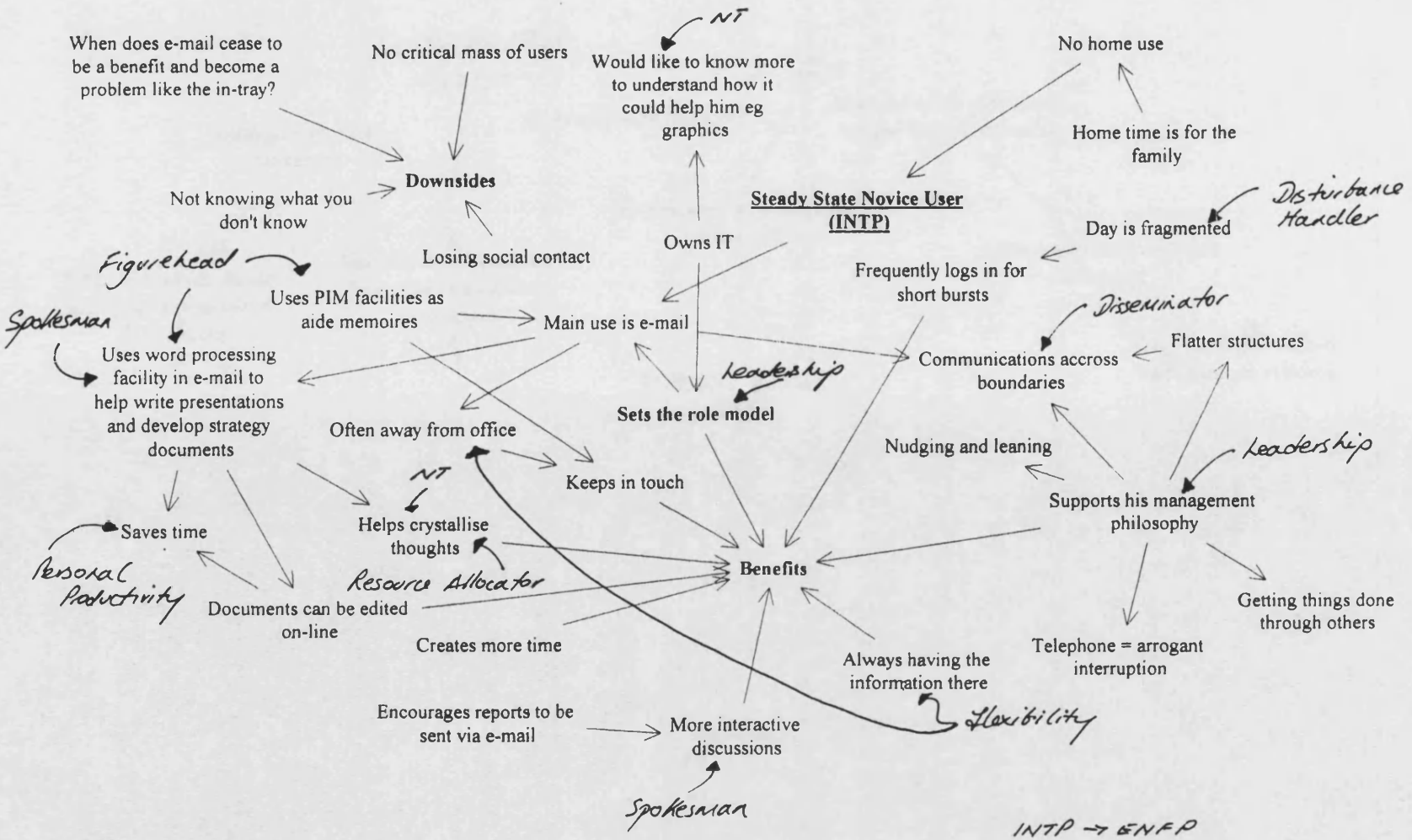




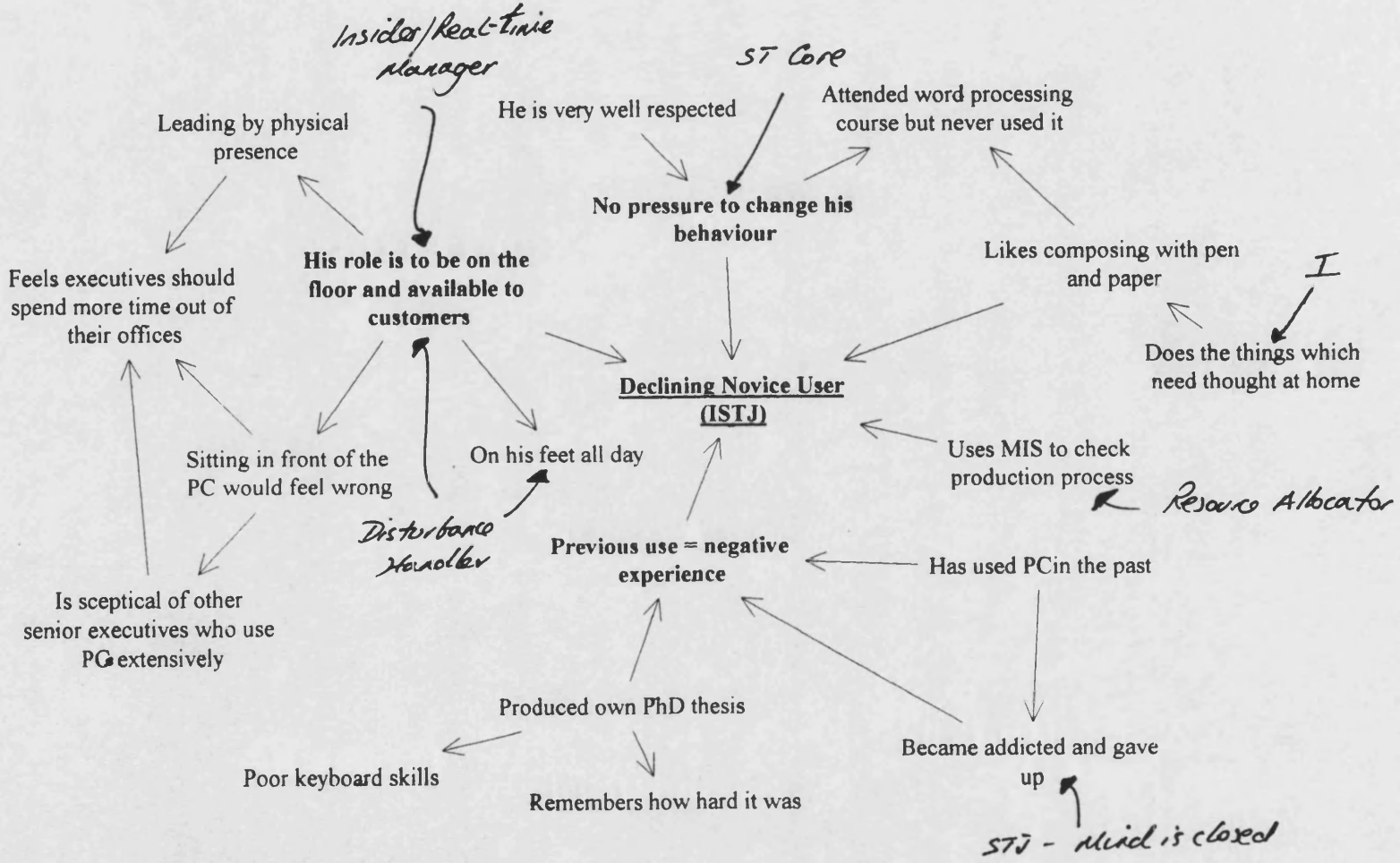
Map 7.6 Making Better Decisions

Map 7.7 Drawbacks to Personal Use of the PC

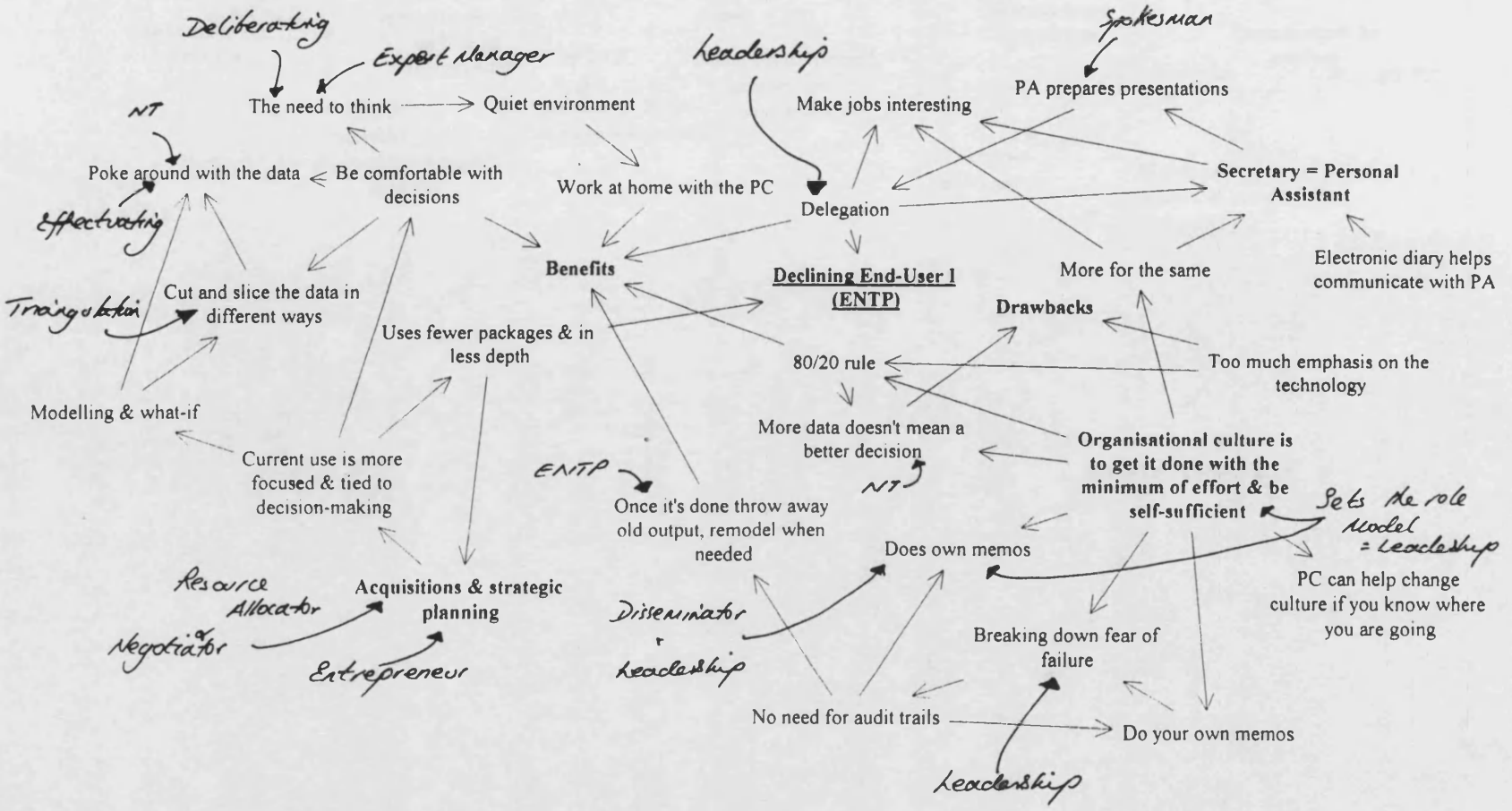




Map 7.8 Executive F1 Key Interview Themes

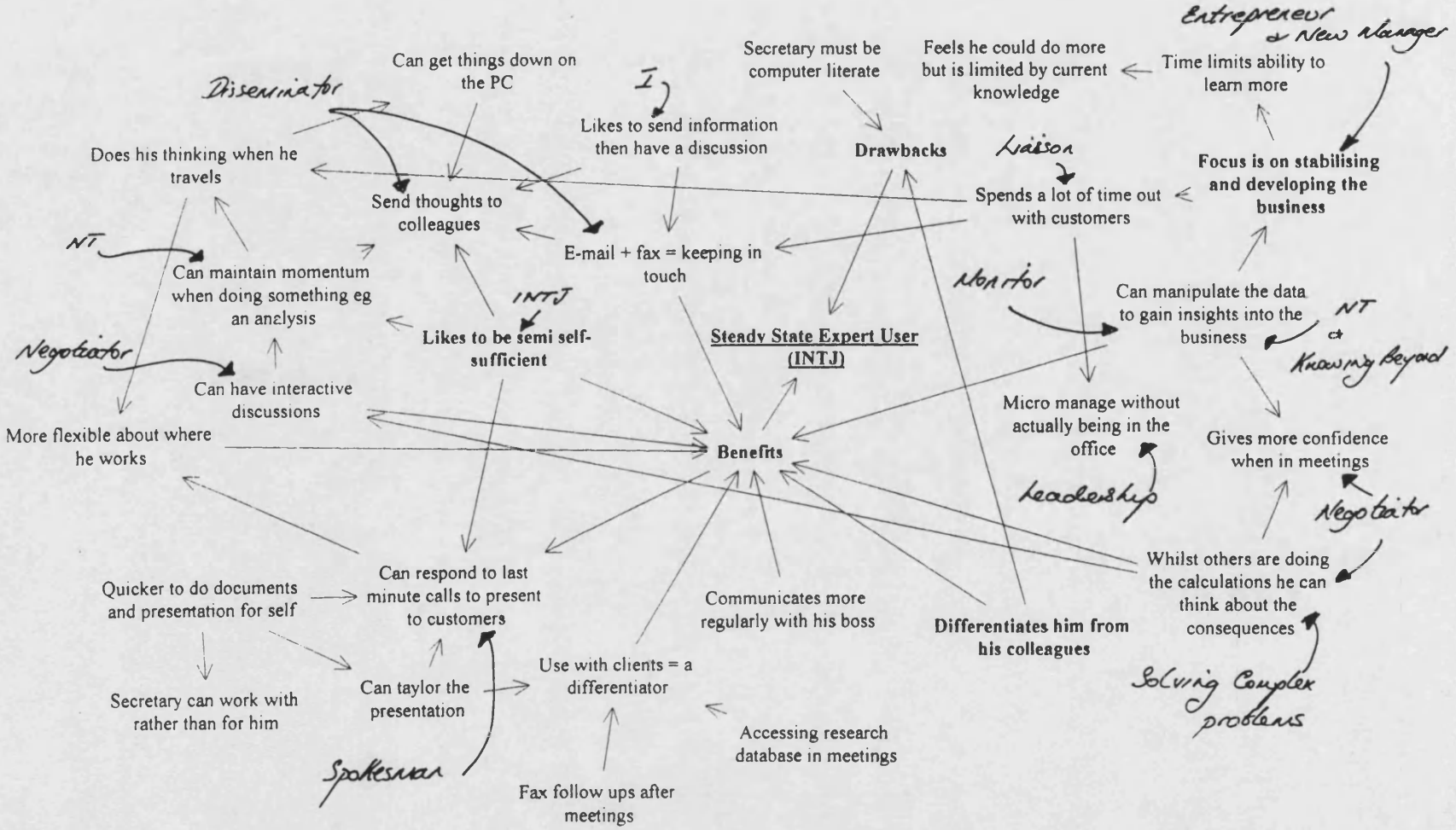


Map 7.9 Executive E1 Key Interview Themes

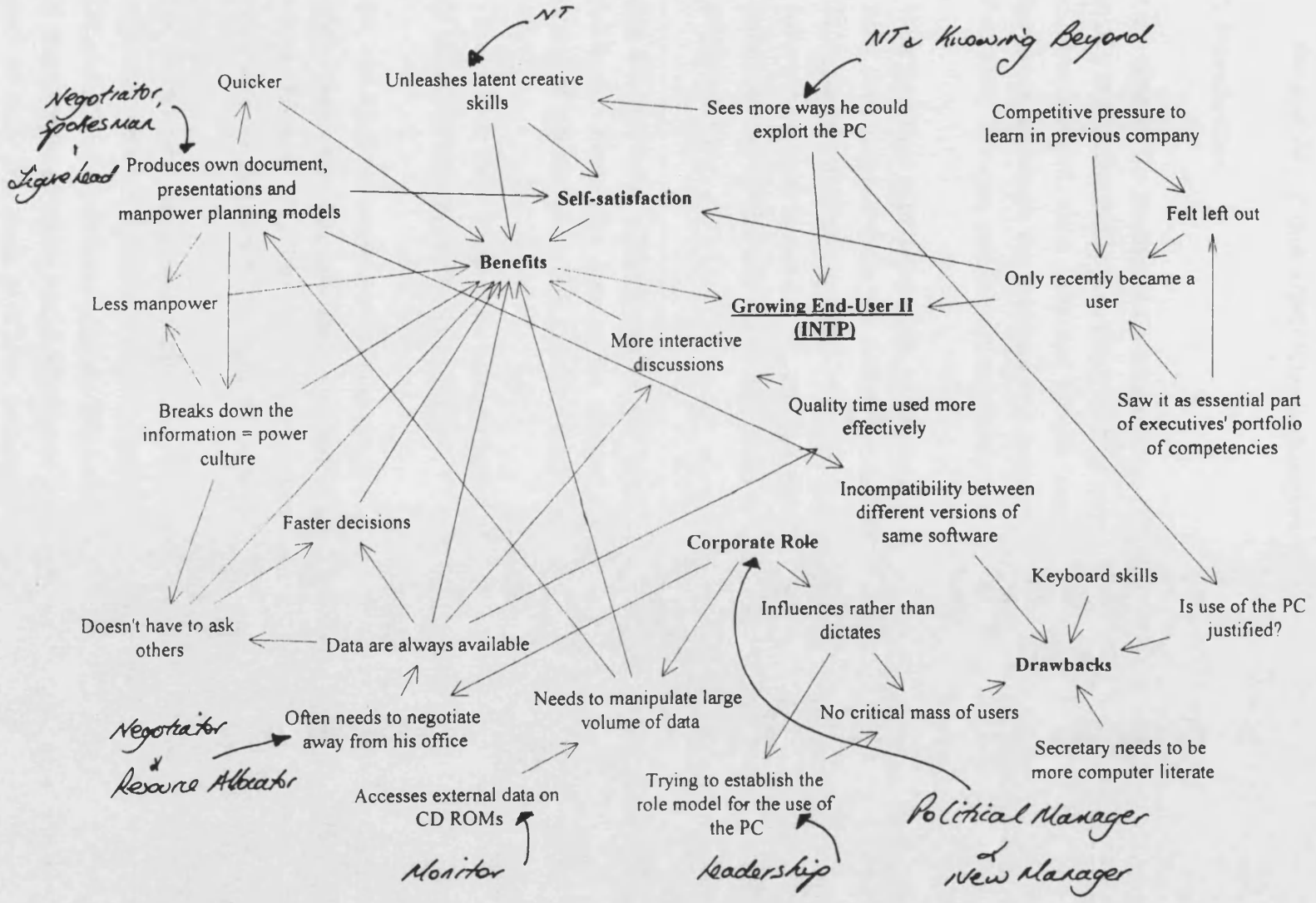


Map 7.10 Executive C7 Key Interview Themes

Map 7.11 Executive D1 Key Interview Themes



Map 7.12 Executive E4 Key Interview Themes



Map 7.13 Executive D10 Key Interview Themes

CHAPTER 8 - The Non-Users

Nine executives in this study made no use of the computer as part of their work as senior executives. This chapter presents the results of the analysis of their interviews and suggests reasons for their non-use.

8.1 Introduction

At the time of the interview nine executives (10.6% of the total sample) made no use of a computer to support them in their work as senior executives. The same sociodemographic data collected for the users was also collected during these interviews, although the emphasis of these interviews was changed slightly to reflect their non-use, and in particular they were asked about:

- their previous experience with computers;
- how they tackled tasks for which the users felt computers and particularly PCs offered valuable support;
- future intentions to use the PC, and specifically, if they could envisage making personal use of the computer and if so what benefits they perceived they might obtain.

Table 8.1 provides a summary of the nine non-user executives' antecedent conditions. From this data at the surface level of analysis there are several nuances of interest about this group of nine non-users.

- Three never used a computer at any point during their lives either for work or domestic activities (C5, R1 and R5);

- Six had used the computer at some stage; two of these had been medium to high level users (D2 and D9); two had made very limited use, as novice users (E3 and M2), but subsequently given up; and two had used the computer but not directly to support them as managers (F6 and M6);

- Six (67%) had been responsible for the strategic deployment of their organisation's MIS resources either as part of their current position (M2, D2, D9 and R5) or a previous position (F6 and R1). This compares to only 38% of the sample of users who had similar responsibilities, either directly as part of their job, such as C7, or indirectly as a result of being the chief executive of their organisation, such as B1 and F1.

Table 8.1 Non-Users' Antecedents

Antecedent	C5	E3	D2	D9	F6
Age	41 - 50	Over 50	41 - 50	Over 50	41 - 50
Gender	Male	Male	Male	Male	Male
Education	*	BSc	BSc	PhD	BSc
Prior computer experience	Never made any personal use of computers.	Tried to use the corporate personnel system. Used as a research chemist. Wanted to learn to use a PC and was given a palm-top.	Extensive user in previous organisations where use was the norm. Multimedia PC at home used for personal finances. Currently responsible for migration of corporate MIS.	Medium level user in previous division of the parent company, and managed implementation of EIS and e-mail. PC at home used for personal finances. Currently responsible for MIS in his business unit.	Never used one as a management tool. Used one at home to support activities as secretary of a sports club. Had been responsible for corporate MIS.
MBTI	ISTJ	INTP	Not Available	INTJ	ISTJ

Antecedent	M2	M6	R1	R5
Age	41 - 50	Over 50	Over 50	Over 50
Gender	Male	Male	Male	Male
Education	BSc	PhD	O-Levels	A-Levels
Prior computer experience	Tried e-mail. PC at home used for personal finances. Responsible for corporate MIS function	Never used one as a management tool. Used computers as a research chemist.	Never made any personal use of computers. Was responsible for selecting corporate logistics systems.	Never made any personal use of computers. Has managed corporate logistics system. Responsible for acquisition of IT for his division of Organisation R.
MBTI	ENFP	Not available	ESTJ	ESTJ

Note: Education represents the highest academic qualification obtained.

* = left secondary school with no formal academic qualifications

- All were over 40 years old and at least three of the latter were close to retirement (E3, M6 and R1). In Section 6.3 it was shown that age was the only statistically significant quantitative differentiation between the user types, in that the older executives (age > 40) used a smaller range of applications compared to the younger executives (age < 40).

- The four (C5, F6, R1 and R5) who had never used the computer as a management tool all had traditionalist (ST) MBTI core profiles. The three (E3, D9 and M2) who had either tried or used the computer as a management tool had visionary type cores (two NTs and one NF).

8.2 Reasons for Non-Use

The procedures for data analysis, as described in Chapter 4, were used to look in more detail at why these nine executives did not use the computer. One main theme pervaded each of the interviews, which was that these executives did not perceive that personal use of the computer offered them any net value in terms of enhancing how they operated as senior executives. This main theme comprised three inter-linked categories with associated concepts, as shown in Map 8.1. In order of frequency of citation, starting with the most frequently cited categories, they are as follows.

- 'Equivocal about benefits'. Eight (E3, D2, D9, F6, M2, M6, R1 and R5) were equivocal as to whether or not interacting personally with one was the best use of their time and added value to what they did. Five (C5, M2, M6, R1 and R5) specifically cited the associated concept of 'no perceived need to change current behaviour'. They felt they had executed their jobs thus far without the aid of a computer as a management tool, and in terms of rising to the top of the organisation, they perceived their behaviour had been successful and could see no reason to change. Three (C5, R1 and R5) cited the concept labelled 'PC syndrome had passed them by'. They had never had a reason to use a computer of any form during their lives (whether as part of their life as a student, at work or at home).

- 'Incompatible with job and roles'. As shown in Map 8.1 this category is so closely linked to the other three categories and concepts, it was hard to explicate which was the more dominant theme. However, five (C5, D2, D9, F6 and R1) specifically cited this as the overall reason for non-use.

- 'Inadequate corporate MIS systems'. Five executives (D2, D9, E3, F6 and M6) specifically cited the associated concept of 'lack of useful data' in terms of feeling that that which was available did not meet their needs, and three (E2, M2 and M6) cited the concept labelled 'unfriendly user interface'.

Nearly all these categories and associated concepts have been discussed in Chapters 6 and 7 either in terms of the encounters which caused a decline in use or the drawbacks the users perceived resulted from their personal interactions with the PC. Similarly, as indicated, these categories and the associated concepts are closely inter-linked, as illustrated in Map 8.2. To explicate these linkages, again this will be done by providing a detailed analysis of one complete interview (F6) and supplementing it with excerpts from the other interviews as appropriate.

8.3 Executive F6 (Map 8.2)

F6 is the Divisional Director for a region of Organisation F, and in many respects his role and antecedent conditions are similar to those of F1 (Table 6.13 in Section 6.7.11). When there is a major incident involving his division F6, like F1, has to give a media briefing. F1 (as discussed in Chapters 6 and 7) expects his engineers to send him a report by e-mail which he accesses directly for himself. F6, however, relies either on receiving a verbal briefing directly from his engineers, or waiting for his secretary to print out any relevant e-mails. F6 takes the view that 'if people really want me they'll get me on the phone anyway'.

As a privatised public water utility his industry as a whole has been subjected to considerable government and public pressure over the past twenty four months in terms of operating more cost-effectively whilst simultaneously improving the service they provide to their customers (for example, Boulton, 1995; Parker, 1995). Just prior to the interview there had been redundancies in other water companies and as a result he perceived within the industry as a whole that people felt insecure. Whilst he felt the companies in question were over-staffed this was not the case in his company. During the interview he spoke at length about trying to walk the fine path between engendering confidence in the workforce in terms of there being no redundancies, and concomitantly making it clear to employees that they could not be complacent and assured of a job for life. He also expressed concern about a number of environmental issues and government legislation which was not in his view congruent with preserving the

available natural resources of water. (Since the interview he has been in the media expressing these views).

Like F1, F6 is the 'public face of his division'. His job too seems to be akin to that of both the political manager (Mintzberg, 1973) in which the emphasis is on the spokesman and negotiator roles, and especially the former, as shown in Map 8.2. As shown in Map 8.2, F6 has used the computers in the past to support his leisure activities and been responsible for MIS. However, in contrast with F1 (as discussed in Section 6.7.11), F6 currently makes no personal use of the computer as a management tool, commenting that 'I certainly wouldn't want you to think I'm not keen on computers; I would have one if I thought it would be an advantage to me.'

In terms of his previous personal use of the PC to support his leisure activities, F6 gained a sense of 'personal satisfaction', as indicated earlier in Section 6.7.1.1, but this questions the real value, as illustrated in this comment:

> '... you got fun out of (it) but not necessarily efficiency, but fun out of getting the computer to do it in an efficient way. Overall it would probably have been easier to have written the labels by hand, but you know you got fun out of doing it.'

As an executive, F6 can see a role for the computer within his *modus operandi*, and in particular an e-mail system with document management facility and better management data as expressed in these comments:

> 'Sharing documents, now for e-mail to work really well, what I would like is to see no paper on that desk at all. I would like all incoming letters, all documents or what-ever, to be available (electronically) ... then I can see you begin to get a system which is quite good ... and that is beginning to get meaningful.' Currently he feels, 'you've got a half-way house. If you've got a document that's come in, I might decide to send an e-mail message to somebody asking for their comments or make a few comments and be able to send it on. (With the existing system) you can't in fact do that. You can either send them an e-mail and say "these are my comments", the document is following by courier, or you just send them a memo in the traditional way with the document.'

For F6 the term 'come in' is related to external documents such as customers' correspondence and regulatory information to which he has to respond as part of his role as figurehead and spokesman. From this comment and the remark below, F6 gave the impression that he is more focused on dealing with people external to the organisation than F1, whereas for F1, as illustrated in Section

7.4.11, his interpersonal roles are more oriented towards dealing with the internal people issues.

'What are we doing with having electronic stuff whizzing around between ourselves but not the stuff that's come in from outside, customer stuff.'

In terms of useful business data, F6 envisaged having information about accounts, water quality, progress on the investment scheme year to date and future plans, etc.

'What I am waiting for is, and I will most certainly have the system then, is when I can get more data from it, business data. ... All that sort of data; if that was readily available that would save a lot of paper being in my desk drawers and things, and obviously it would be up to date, rather than relying on monthly reports and things of that nature.'

Currently such data is available but not in a format which is either readily accessible or integrated. It is spread over many different systems.

'It's like any organisation where you have, over a period of ten, twenty years there's many systems been built up and they need linking together more and more, which one is always assured is possible but never quite works like that.'

Like F1, F6 has to prepare and give many reports and presentations but all the work of producing them is delegated to either his secretary or another manager, eg., preparing budget data. Nonetheless, F6 commented that :

'... (it) would be lovely to go through the machine and burrow down to explore the cause of an oddity. ... I think it would actually be useful to do it yourself.'

On the one hand, therefore F6, can envisage how his personal use of the PC might be useful, but from his comments about his previous personal use of the PC he is not entirely convinced that it is the best use of his time. Moreover, he is sceptical about whether or not it is the best use of an executive's time to be typing e-mails regardless of their length. In this context he is referring to his colleague F1, and one wonders if he is not being adversative, for as Machiavelli (1513, p. 51) said: 'The innovator makes enemies of all those who prospered under the old order, and only luke-warm support is forthcoming from those who would prosper under the new system.'

Like some users, F6 questioned whether or not electronic reports are as easy to handle as paper-based data, especially in terms of data, of interest and 'scribbling notes in the margins'. He, too, was concerned about the change in emphasis of work between the secretary and the managers, doing their own work, and was concerned with the ultimate impact on the secretaries' jobs, '... do you get to the situation where you don't need a secretary? ... Or does it thin down the work content of a secretary?' However, it is notable that, unlike the users and certainly the more advanced users, F6 talks more about diluting rather than enriching the secretary's job.

Within these comments are the categories of non-use (Map 8.1) labelled 'inadequate corporate MIS systems' and the associated concept of 'lack of useful data' and 'fragmented systems', and the category of 'incompatibility with the job' and in particular the associated concept of 'lack of useful data' and being able to 'delegate PC-based tasks'. However, for F6 the main reasons for his non-use seem to relate to the category of 'inadequate corporate MIS systems', and 'equivocal about the benefits of personal use'. The heavy emphasis on the inadequate MIS systems may well be a front for much deeper convictions. For example, his MBTI core is that of the traditionalist and from one side the need to justify a change in behaviour before making the change is consistent both with his core type and overall profile as an ISTJ. However, pulling him towards the use of the computer is ability to 'burrow down' the data which might appeal to an ST. On the basis of the preference for the inner world (I) one might expect the computer to appeal, and yet he was a little scornful of those who interact directly with their own mail. Perhaps this was more of a defensive reaction?

Whilst he said he found using the PC at home was fun, it may not be fun as in the conventional definition of the term: 'diversion, amusement, sport; also boisterous jocularity or gaiety. Also a cause of amusement or pleasure.'[1] When probed about what he meant by the word 'fun' he responded by saying, with a laugh:

> 'total enjoyment of making them come out right. Have you ever tried getting addresses printed out on labels in the right spots and not on the fold?'

There is perhaps just a touch of determinism in this, in that the fun was more akin to satisfaction that he had achieved his goal, which undoubtedly may

[1] Oxford English Dictionary

engender a feeling of enjoyment at the time, but perhaps it was not an experience he wanted to repeat.

8.4 Other Aspects of the Non-Users

This detailed analysis and interpretation of F6's interview has illustrated most of the concepts associated with the three main categories of reasons why some executives make no personal use of the computer. However, there are five associated concepts which were not so pervasive in his interview and which are better explicated by comments from other executives and specifically linked to the concept of:

- 'incompatibility with the job/role':
  1. 'no perceived need to change one's behaviour';
  2. 'decisions are judgemental';

- 'inadequate corporate MIS':
  3. 'unfriendly user interface';
  4. 'main priority was implementing adequate corporate MIS databases';

- 'equivocal about the benefits':
  5. 'PC syndrome had passed them by'.

8.4.1 No Perceived Need to Change one's Behaviour

This has been discussed in Chapter 7, with respect to E1 and M2, as a reason for why the latter tried to use the PC at work but gave up after his initial foray and why the former made minimal use of the computer as a management tool. Not surprisingly, this concept was also highlighted too by at least five of these non-users, as illustrated by these excerpts from C5, M6 and R1.

C5 is the Director of Finance for his division of Organisation C and has been with the company for 20 years. He had never made any direct use of a computer at work, and does not have one at home, and expressed no interest in them whatsoever. He plays chess and once tried a PC-based chess game, but said he 'couldn't be bothered' with it. He regularly arrives at the office at 7 am and spends the next two hours communicating with Japan and Australia. In terms of his *modus operandi* as an executive he said:

'From my position our business runs very satisfactorily without (my) use of personal computers. We have them obviously in the department and we have a computing department. ... Obviously in a finance position I have to monitor other areas, debts and credits and bank accounts, etc., but again I don't find the use of a laptop computer will personally help me. It's very much a personal decision. ... If it (the PC) was essential then I would use it, but it's not. It's a matter of choice.'

Executive C2

R1, who works for his company as the director of Retail Logistics and Supplies, has been with Organisation R for 42 years, joining at the age of 16 when:

'... you were issued with a pencil and that was all you got. You wore it down until it was about an inch long and you could prove that there was little point in sharpening it any more and they gave you another one.'

He has always been in logistics and, like C5, had a set pattern of working which involves touring the depot on arrival at 8 am and later said:

'... my personal interest all my life has been in warehousing. So I am still an old died-in-the-wool operator ... my four-year-old granddaughter works the video recorder much better than me.'

'One of the things that I've managed to do over the years as well is to survive by not producing endless bits of paper. ... I'm a people person. I tend to go and see people much more. ... It's far better for me to go and ask people about the work. I mean, they might look at the screen and then tell me, but at least it's made them speak and use the information. And they also I think and they feel that you're interested in them.'

Executive R1

M6, too, admitted being set in his ways.

'... I go in five years, so I'm not going to go looking for that (doing his own word processing). ... I deliberately refuse to co-operate, in that I'm not interested in cluttering my mind with a whole set of things about that system (e-mail).'

Executive M6

As noted at the start of this chapter, these executives were asked how they executed tasks for which the users found the PC beneficial, for example dealing with urgent correspondence when their secretary was not around, preparing

presentations and strategy papers and manipulating financial data to suit their need. In each case either they relied on others (as indicated by F6 and C5) or felt their operating environment did not make such demands on them, as illustrated by the quote from R1 in terms of not generating much paperwork.

8.4.2 Decisions are Judgemental

C5 and R1 specifically stressed that their decisional roles involved making decisions based on subjective judgements rather than hard facts.

> 'I feel that my job is really judgemental based rather than based on facts. Obviously the judgements are based on the facts. I suppose arrogantly I feel that the data that I need is stored in my head, if you like, and most judgements, and we're very judgemental based, are based on experience, rather than looking at facts and deciding. It's really thinking through a particular case and really formulating a decision. It's not really a database decision business. You are looking at a film perhaps and you're seeing whether you can, you want to invest in it, put $5m or $10m in. It's not really based on figures, it's really based on your perception of whether it's a commercial film, who the director is, and a general, if you like gut feeling, rather than: a film did £10,000 last year therefore it should do £11,000 this year. Those investment decisions are not, if you like, financially based.'
>
> Executive C5

C5's department (within his division of Organisation C) is responsible for ensuring payments are received on time, and the rights to a film/video are sold only once. So C5 spends quite a lot of his time out of his office either internally liaising with others involved in a project or out with clients, agreeing schedules of payments.

There are parallels with what C5 says about how he makes decisions and H4, a novice-user. H4 only interacts directly with the corporate e-mail system because, as indicated in Chapter 6, it is the cultural norm in Organisation H. H4 is responsible for sanctioning loans of up to £1.5m to clients and uses the mainframe on-line client account management system passively in order to carry out his work. Otherwise H4 would be regarded as a non-user, having never used the computer interactively. Indeed he said '(I) wouldn't even know how to switch (a PC) on.' He too feels much of his decision making is based on 25 years of experience.

'If funds in use are £280K and I've got a problem, manipulating (the data) doesn't take the problem (in terms of their debt). I've got to do some thing else really to get over the problem, which is nothing at all to do with the information which is either on the mainframe or a PC unfortunately. If it were as simple as that I would have over a dozen PCs. One of the things I have to do is I actually have to spot creative accounting.'

Executive H5

C5, H5 and R1, like others (such as B3, C3, E1 and D6), see themselves as working directors and a mixture of real-time managers (Mintzberg, 1973) concerned more with the day-to-day operations than long term strategy, almost the insider manager, and expert managers (Mintzberg, 1973) who operate and make decisions based on their expert knowledge. Like some of the users, such as C3, they have certain set tasks which only they can execute by virtue of their functional position; they cannot be delegated, as seen in the previous excerpt from C5 and this one from H5.

'... of (all) the directors' (jobs) mine is the doing job, principally because I've got this high sanction authority. Work has to come to me, I can't actually push it anywhere else, because there is nobody else to do it. So the bulk of my day is spent on actually doing things rather than management, simply because if you have a sanctioning authority twice as much as the next one below you, you are going to end up with a lot of work.'

Executive H5

8.4.3 Unfriendly User Interface

This concept has been highlighted as a reason for being deterred from using the computer by M2 in Section 7.4.4.1, and was endorsed by the following quotes from E3 and M6. E3 travels more extensively than M2 but like M2 he had also tried to use the corporate e-mail and MIS system.

'I discovered that to get to an employee's record took me nineteen different and consecutive operations, that's why I say it is not user friendly.'

Executive E3

This excerpt from M6 highlights many of the problems both the non-users and the users encountered.

'The principle thing that bars me (is) it just irritates me, you have this inexplicable stuff of, you enter a pass-code which must have a dot at the right point. Why the system cannot

simply accept my password and then tell me which systems I want to go in to. I have no qualm about this, because having programmed and driven computers ... I would perfectly happily use e-mail and computers, except the frequency with which I use them at the moment means I have to have practically a training course to get in to the right screen. When I get there these immoral things written about help, are totally written from the wrong perspective. So I don't find them to my personal productivity at the moment, because of the lack of simplicity in access.'

Executive M6

Whilst there is no doubting the need to implement secure systems, there might be a case for arguing that too much security can have the opposite effect and act as a barrier to those for whom the system is actually designed. However, again in the case of F6, these comments from M6 may also be covering some much deeper personal equivocations about the value of the computer as a management tool, as alluded to in his comment, '...it (the computer) gives an illusion of being in control rather than being concerned about strategy'.

8.4.4 Main Priority was Implementing Adequate Corporate MIS Databases

D2 and D9 had been medium to high level users in previous organisations. They had recently been appointed specifically to implement strategic business systems which neither of their divisions of Organisation D possessed. They cited their preoccupation with this task and the concomitant lack of available core business data as the main reasons for their non-use. The lack of underlying business systems was also cited specifically by C2 and C6 as one of the reasons which triggered them into their current episode of declining personal use.

8.4.5 PC Syndrome had Passed Them By

In the case of C5, R1 and R5 they had thus far avoided making any personal use of the computer, as indicated in the preceding sections, as illustrated by the following comments from R5.

'I guess probably in the sort of job that I've done with Organisation R I've either had a secretary who can use a PC and word processor and that sort of thing, or found it difficult to justify Executive R5 having his own tool. ... That may sound rather weak, but I am and have been in various jobs responsible for controlling capital expenditure. And I guess I haven't justified the expenditure for myself. It's maybe wrong ...'

Executive R5

He said he felt there might have been times when it would have been beneficial if he could have used the PC, especially when preparing budgets.

> 'I think in hindsight I would have been more comfortable if I'd had the control at my finger tips and I was not reliant on other people providing me with information'

Although R5 has some reservations about e-mail, preferring to have the correspondence on paper, he has decided to try to learn to use a PC and is booked on a course.

> 'I think I saw the growth of PCs in fitting out this building. It seemed that everybody was going to have a PC on their desk, and this was not a status symbol in any way. It became abundantly clear that we were going to be networking through the office far more than hitherto. ... I will probably be a very old student in comparison to a lot of young things who probably know a lot ... but I just thought it was time I knew more about it.'
>
> Executive R5

These three executives (C5, R1 and R5) therefore had no personal first hand experience against which either to benchmark how the computer could help them or to form their own mental model from which they could conceptualise how the computer could help them.

8.5 Summary and Discussion

Compared to the users, and especially the medium and heavy users, these non-users conveyed an impression that overall they could see no explicit reason to make personal use of the computer. Rather, they acted as chauffeured users (Culnan, 1983). The reasons for non-use are intimately linked, as shown both in Maps 8.1 and 8.2, and the analysis of the interview data.

They are similar to those proffered by other executives who do not make extensive personal use of the PC, and in particular the declining users and the steady state low level users. The explanations for non-use found in this study are similar to those identified by Martin (1988) and Boone (1991), and support some of their findings. However, neither Boone (1991) nor Martin (1988) made any reference to the underlying personality attributes of the executives.

Four of the executives (C5, F6, R1 and R5) had traditionalist (ST) MBTI core profiles which would draw them towards traditional patterns of behaviour and

maintaining the *status quo*, although, as shown in Chapter 7, there was no statistical significance with respect to core type and computer use. Nonetheless, overall the results of the analysis of the interviews presented here provide evidence of these non-users behaving in the more traditional manner of 'knowing how' and 'knowing that' but perhaps not 'knowing beyond' (Herriot and Pemberton, 1995). There is also an undercurrent of their preference for 'acting with' their bodies (Zuboff, 1988) and 'doing' by leading through their personal presence and actions rather than through either other people or information (Mintzberg, 1994). Certainly this is the case for C5 and R1. It is almost as though they see the use of the computer as a mutually exclusive alternative behaviour to that of 'doing' and being with their teams. However, this rationale is not exclusive to the non-users, as seen in the comments in the previous chapters from executives such as B2, E1 and G3.

These non-users were all over forty years of age, indeed five were over fifty and had been senior executives for several years. As such they had formed their behaviour patterns and had decided which aspect of their job to emphasise and how they would execute these different aspects and the associated roles (Stewart, 1982; 1991). In making such decisions they had chosen not to make direct use of the computer to support them. In terms of use, age was the only statistically significant factor, as shown in Section 6.3, in that the older executives used a more limited range of software than the younger executives. Table 8.2 shows a comparison of the users and non-users in terms of age. The results suggest that non-users are more likely to be older, but it was not possible to calculate a chi-square value to test the statistical significance of this relationship because all the non-user cells had expected values of E< 5.

Table 8.2 Comparison of Non-Users to Users in Terms of Age

	Age < 40	Age = 41-50	Age > 50	Total
Non-Users	0 (= 0%)	4 (= 8.89%)	5 (= 20.83%)	9
Users	16 (= 100%)	41 (= 91.11%)	19 (= 79.17%)	76
Total	16	45	24	85

Notes: Age is in years. % represents the % of the age group who are either non-users or users.

Five of these executives (D2, D9, F6, M2 and R5) expressed an intention to use the computer if and when either more useful information was made available (D2, D9 and F6) or they had more time and the system was easier to use (M2).

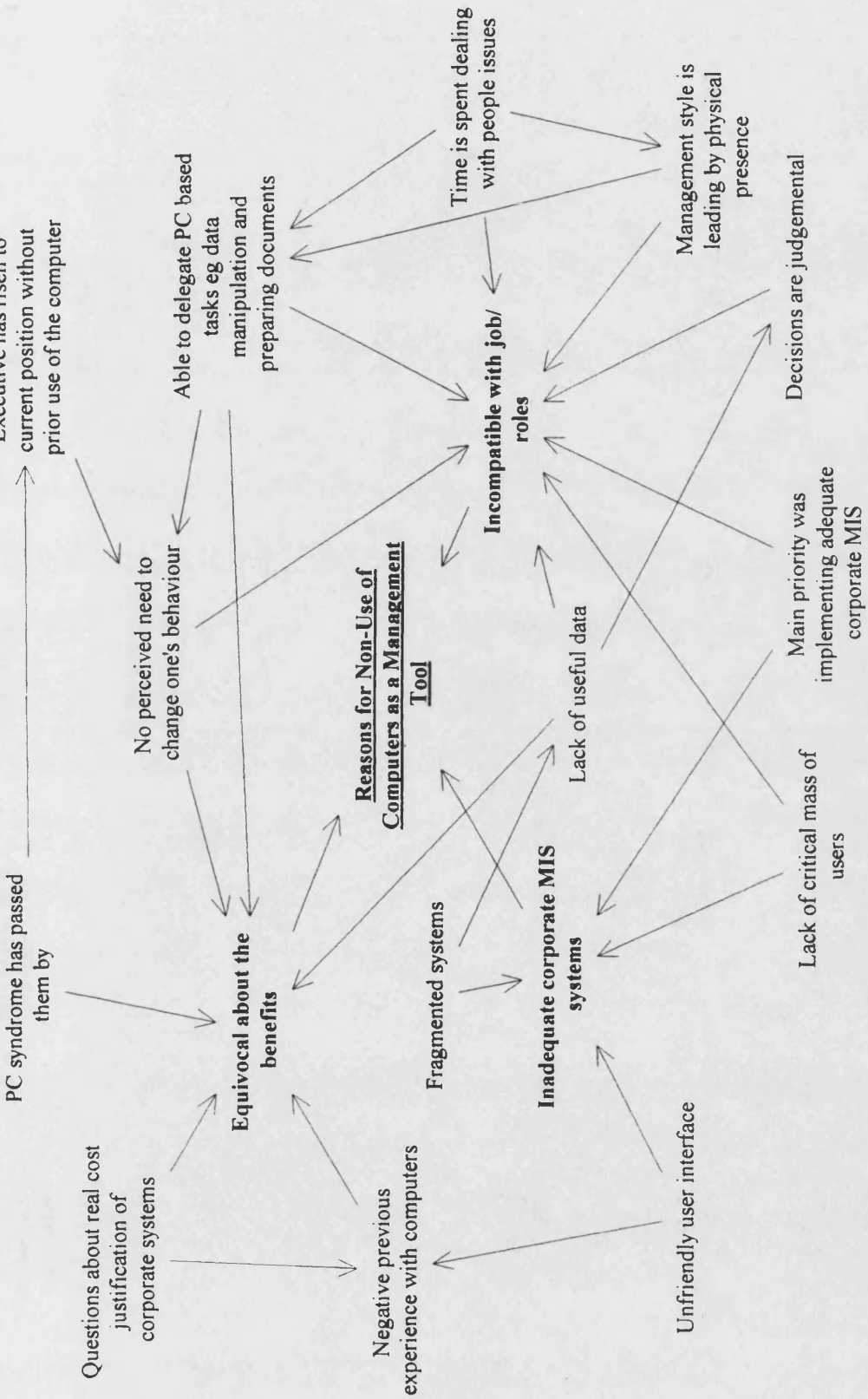
Of those who had never used a computer, only R5 demonstrated any clear behavioural intentions to try to learn to use one.

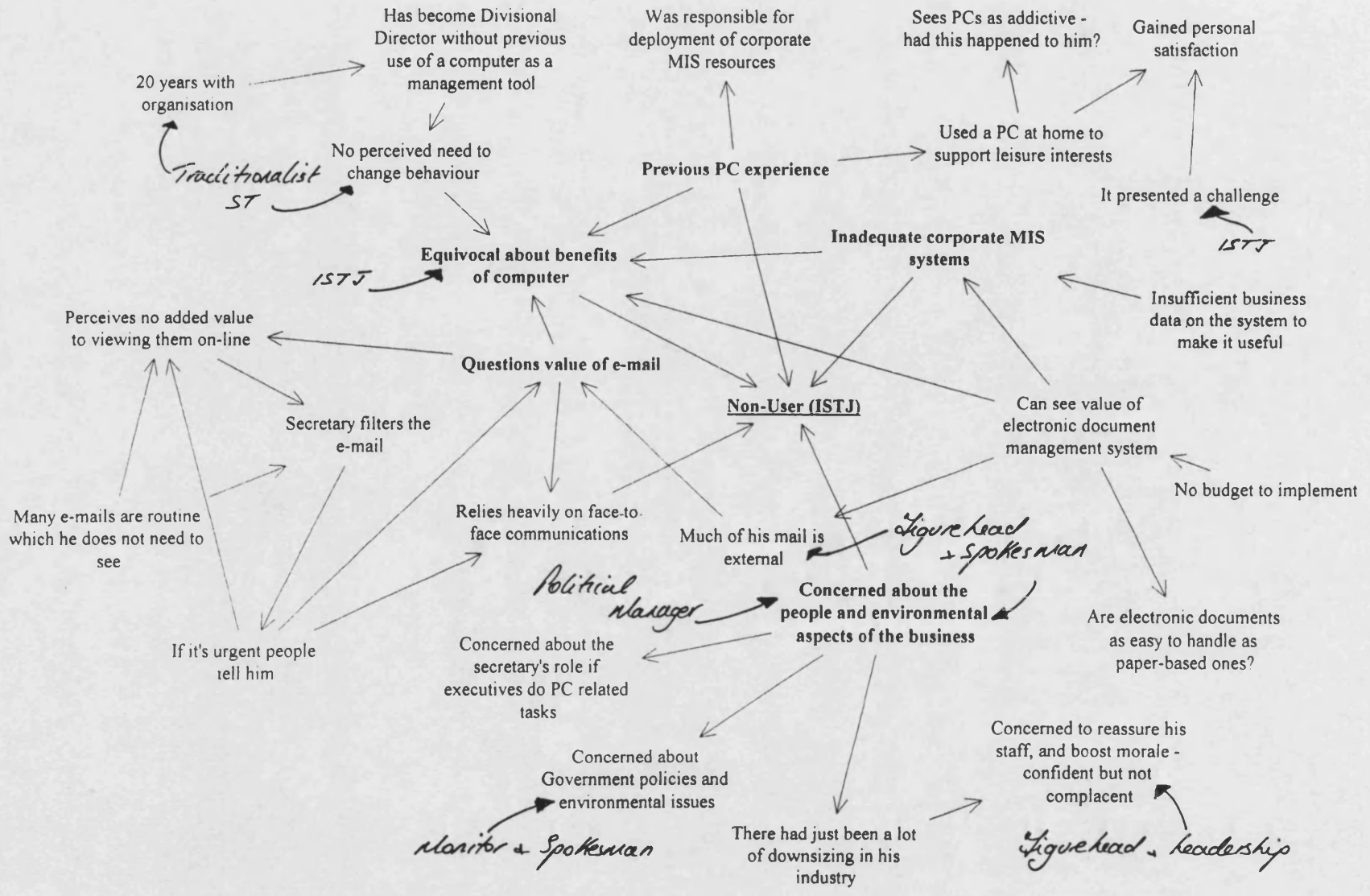
Boone (1991) suggests that the reasons for non-use are mythical, given that the users have managed either to overcome or work around them. Nonetheless, the fact remains that for the majority of the non-users in this study, these factors represent reality and as such prevent them from perceiving any connection and linkage between how they behave as senior executives, and how they might benefit from personally interacting with a computer.

As in the case of the users, from the data available in this study it is hard to explicate more precisely which of the categories and concepts cited as reason for non-use is the more prevalent, and whether it was their perception about their role or their personalities which were the more dominant factors.

Lastly, it is interesting to note the comparatively high percentage (67%) of these non-users who had at some time been responsible for the deployment of the corporate MIS resources, compared to 38% of the users. From the data available from this study no specific inferences can be drawn from this fact. In the light of the work of Feeny *et al.*, (1992) and Schein (1992b), it would have been interesting to compare the performance of the MIS functions managed by the users to those managed by the non-users, but this was beyond the scope of this study.

Map 8.1 Reasons for Non-Use of Computers as a Management Tool





Map 8.2 Executive F6 Interview Themes

CHAPTER 9 - Summary and Conclusions

This chapter presents the overall findings of this study, and based on these, posits a model of the executive as an end-user. The practical applications and limitations of this research are discussed, and areas for further research are outlined.

9.1 Summary of the Results

This study explored the personal use executives made of computers, and in particular the PC, to support them in their work as senior executives. The results are based on the interpretation of interviews and personality data from eighty five executives drawn from eighteen different companies. Of these eighty five, seventy six were classed as users from the perspective of using the computer in some way to support them in their executive work and nine were classed as non-users in that they made no use of the computer as a management support tool. The proceeding sections present a summary of the main finding of the study and, based on these, a proposed model of the executives as end-users.

9.1.1 Senior Executives' Level, Extent and Continuity of Use

Previous studies have tended to regard the term 'use' as a single and at most, two-dimensional construct, that is to say level in terms of depth and breadth of use and frequency of use. This research has shown that for senior executives use can be viewed as three broad and related constructs:

- level - the depth, breadth and frequency of software packages used;
- continuity - the variation in level and extent of use over time;
- extent - the range of tasks for which the PC is used.

In terms of level of use, it was found that senior executives could be categorised into one of five groups of end-user in ascending order of expertise: non-users, novice users, intermediate users (end-user I), advanced users (end-user II) and expert-users. Non-users were regarded as those who at the time of the interview made no direct use of any form of computer to support them in their job as senior executives. At the other extreme there were the expert users who had the greatest level of competence in terms of both breadth and depth of expertise, and were often totally self-supporting with respect to their use of the computer, and sometimes even acted as a coach to their colleagues. They seemed continually to

be scanning the horizon for new ways to use the PC to support them as senior executives and their use of the PC has become an integral part of their *modus operandi*. The latter was one of the main qualities which distinguished them from other user groups.

In contrast, at the other end of the spectrum, the novice users used the smallest range of software, often only e-mail and an EIS (where available). They needed the most support and their horizons with respect to their personal use of computers were limited to that which they had to do. Their expertise was founded on a basic kernel of knowledge about computers which was grounded primarily on current and past experiences, and they rarely sought new opportunities to use the PC as a management tool. Generally they viewed their use of the computer as an adjunct rather than an integral part of their *modus operandi* unless their use was related either to e-mail or an EIS.

Based on the previous work of Cotterman and Kumar (1989) and Rainer and Harrison (1993) an 'executive end-user cube' was developed, as shown in Figure 6.8. This accommodated each of these five broad groups of executive end-users. Over half the executives in this study had been using computers for up to ten years. Nearly three quarters of the sample (68.8%) used a computer daily: the duration varied from about 45 minutes to four hours. The median range of software used was three to four different packages. The most frequently used software was e-mail (63.5%) which reflects the fact that for 39% of the users, direct interaction with e-mail was the cultural norm. In terms of discretionary use the four most frequently used software packages were word processing (52.9%), spreadsheets (45.3%), e-mail (38.8%) and graphics (24.7%).

There were variations between level of use and the sociodemographic factors (such as age, gender and personality), but the only statistically significant relationship was between age and the range of software use: younger executives were more likely to use a greater range of software than older executives.

Interestingly, of the eighty executives who had used a computer at some point as a management support tool, sixty four (80%) asserted that they had acquired their expertise primarily by teaching themselves. The word 'playing' was often included in the executives' description of how they developed their competence and particularly with respect to the use of the PC, which supports the findings of Webster and Martocchio (1992). Of these self-taught executive users, thirty two recalled attending some formal training. However, most formal training came in

for a significant level of condemnation and few found it a useful learning experience. The biggest criticisms related to the style of training (it was too procedural), and the content (there was too much and it was not closely enough linked to the executive's needs). Ten executives talked of having one-to-one coaching which, not surprisingly, had been well received. Training has been shown to play a significant role in improving one's competence, not just with computers, although the case for computers has been well proven too (as shown in Section 2.3.1.2). Moreover, much is known about executives' preferred ways of learning (Sims and McAulay, 1995) Nonetheless, judging by the comments from the executives in this study, there is little synergy between the epistemologies of management learning and end-user computing.

Regardless of their use and end-user type, most executives spoke of the learning curve as being steep, and requiring an investment in time. Most spoke of not feeling comfortable about 'playing' with the PC in office hours. Therefore this investment was often made outside official office hours either by staying late, or away from the office itself for example, travelling and at home.

In terms of continuity, the executives' level and extent of use had often changed and four distinct patterns of use were identified, as shown in Figure 6.11.

• Steady State - users whose depth and breadth of use have changed imperceptibly over time. In essence users on the steady state path have reached an equilibrium point with respect to their computer expertise.

• Declining - users whose depth and breadth of use have declined over a period of time. At some point these users have been steady state users but an encounter has occurred which has punctuated their equilibrium. The net effect has been a decline in expertise and sometimes also frequency of use.

• Born Again - these are users whose expertise and often frequency of use have declined for some reason, but who are in the process of re-learning to re-use the PC.

• Growing - these are users who have only recently started to use the PC (twelve to eighteen months prior to the interview) and have yet to find their final equilibrium point in terms of both expertise and frequency of use. It is notable that for some growing users this was their first ever foray with a computer.

Using the process methodology techniques developed by Newman and Robey (1992) the episodes and encounters which shaped these four patterns of use were explicated. Regardless of the eventual path, the initial encounter (motivation) to use the computer was one the following:

- an inherent interest in computers;
- a perception that using the PC might be beneficial (often by observing what others had gained from their use of the computer);
- leadership to set the organisational culture with respect to computers;
- a need to use one for a specific task.

One and sometimes several episodes followed during which expertise was developed. Each was preceded by one of the following encounters:

- new technological developments, for example Windows, implementation of e-mail;
- fresh insights into how the PC could be used to support the various roles and tasks the executive had to execute.

For some an encounter then ensued which caused a decline especially in terms of the depth and breadth of expertise. The most common encounters being a change of job or organisation which embodied several associated changes including a change in role and priorities, resources to whom tasks could be delegated, and sometimes level of available technology. It was not possible to isolate which factor was most dominant in causing the decline.

The depth and duration of the decline varied. For the majority it was both steep and prolonged. With the pace of technology changing so rapidly, as it has done over the past three years, most declining users have experienced severe skills loss, often to the point at which their previous expertise is almost redundant. Consequently, as the gap between their competence and the capacity of the PC has increased they found themselves caught in the 'competency trap' (March and Sproull, 1990). A comparison of the declining users and the steady state users, and in particular the high level users such as the advanced and expert-users revealed three significant differences.

- First, in the majority of cases the high level steady state user's (expert and end-user II) motivation to use the PC was intrinsic, for example, a long-term interest in computer technology. In contrast, the declining user's initial

encounter was often extrinsic, for example, peer pressure, and was reactive rather than proactive.

- Second, in most cases the steady state users intimated that they derived a level of intrinsic satisfaction from their use of the PC. The declining users did not give any such impression, although that is not to say that at some point, as users, they did derive satisfaction.

- Third, and especially for the high level users, their use of the computer and especially the PC had become interwoven into their way of working. It was as if they had experienced 'double loop' learning (Argyris, 1991; Argyris and Schon, 1980). They had re-examined and modified their managerial behaviour as a result of their use of the PC. Moreover this was a continuous process of evaluation and re-evaluation as both their roles changed and new technology emerged. Any changes in behaviour were not necessarily radical but incremental within the context of their operating environment.

Conversely, the declining users gave the impression that their use of the computer was primarily an adjunct to their inherent managerial values and behaviour patterns. Only single loop learning had taken place, a knowledge of 'how' and 'that' had been gained but no knowledge of 'beyond' (Herriot and Pemberton, 1995). They seemed much more inclined to drop their personal use at the first available opportunity, preferring to be either minimal or chauffeured users. This supports Rogers's (1983) findings about innovations in general and Martin's (1988) specific findings with respect to managers' use of a DSS. Rogers (1983) found that late adopters often had less freedom than early adopters with respect to their reasons for using an innovation, and that their knowledge about the innovation was often confined to a basic knowledge of use rather than the underlying principles which would allow them to extend their use to more general situations. This is not to say that the declining users in this study were late adopters, but rather to draw the parallel in behaviour. Martin (1988) found that managers for whom the use of the DSS had become interwoven in to their managerial behaviour were more like to continue as users than those for whom this was not the case.

The majority of the growing users were over forty and for several this represented their first interaction with a computer. Their reasons for their first encounter with the PC are very similar to those for the other users, although there would seem to be more emphasis on both the need to demonstrate

leadership and peer pressure. Given their level of seniority and hence the high level of discretion they have over how they operated, most could probably have continued to make minimal to no use of the PC, and delegate their computer use. To some extent this is therefore contrary to the findings of previous authors such as Grindley (1991; 1992) who suggest that many of the current problems regarding the strategic use of MIS are 'generation' related, because older executives are less inclined than younger executives to become involved with computers.

The antecedents for the different user paths were compared and although there was evidence of variations in terms of the sociodemographic attributes of age, gender, educational experience and personality (as captured by their MBTI profiles), none were statistically significant. This again supports Rogers's (1983) and Martin's (1988) findings. Rogers (1983) found the data from previous studies relating to sociodemographic factors was equivocal. Martin (1988) found the only statistically significant relationship was a positive relation between use and previous experience when the latter was present in sufficient quantities.

9.1.2 The Myers-Briggs Type Indicator Data

It had been speculated that there might be some statistically significant relationships between use and either the MBTI core or total profile. For example, it might be reasonable to expect the computer and especially e-mail to appeal more to those with a preference for introversion (I) rather than extraversion (E). In reality the reverse was observed, as shown in Table 7.2; a slightly higher percentage of Es used e-mail compared to the Is. No statistically significant relationships were observed. However, there was evidence to suggest that the use of the computer appealed to different dimensions of each individual's personality and the net result was in fact the sum of several interrelated determinants, not the least of which was how they perceived the demands and constraints of their jobs and the associated roles.

The equivocal results relating to the MBTI, when taken in isolation, may reflect two factors. First, the MBTI profiles of the sample were biased towards visionary core types (NT and NF, and especially the former), which reflects the seniority of the executives in this sample (Gardner and Martinko, 1996). Second, as indicated, use of the PC was found to be related to a complex interaction between executives' perception of their managerial roles and *modus operandi* and their personalities. This is discussed in more detail in Section 9.2.

Completing the Myers-Briggs Type Inventory was optional, and the data from the MBTI always regarded as secondary to the interview data. This data added value and shed light on aspects of the executives' personalities and provided some explanations for their behaviours without which it would have been hard to do. In this context use of the MBTI was deemed successful.

9.1.3 Executives' Use of the Computer in the Context of Managerial Work

Whether or not executives should be concerned about their own personal use of the PC has been the subject of considerable debate. The executives in this study used their computer for a diverse range of tasks, as summarised in Table 7.1. The tasks were similar to those identified by previous authors such as Boone (1991), Fisher (1992), King *et al.*, (1992), McKinnon and Burns (1992), Martin (1988) and Rockart and DeLong (1988), although the evidence from this study suggests that the high level users (end-user IIs and experts) were using their computers and especially the PC for a more diverse range of tasks than previously noted.

There are two obvious reasons for this. First, and perhaps more obviously, the range of user-friendly end-user software has increased significantly during the past five years. Second, most previous studies of executive computing have focused primarily on the computer as a tool to support certain aspects of the decisional and informational roles (Mintzberg, 1973). As summarised in Table 7.6, the results of this study showed that in the right circumstances the computer can be used beneficially to support each of Mintzberg's (1973) ten managerial roles.

The benefits the users reported they obtained from their personal use of the computer could be broadly grouped into six categories: 'gaining personal competitive advantage', 'increasing personal productivity', 'being more flexible', 'enhancing the thinking process', 'achieving personal satisfaction' and 'making better decisions'. Each of these six categories has several associated concepts, as shown in Maps 7.1 to 7.6. Far from being an impediment (Mintzberg, 1989) and disabling the creative thought processes as some authors, such as Lilley (1992) and Weick (1985) have suggested, the executives in this study by and large found their use of the computer provided valuable support, enabling them generally to be more productive and in many cases more innovative.

Again, these results support the work of those authors who have specifically studied senior executives, and also the work of Igbaria *et al.*, (1995b) and Davis *et*

al., (1992) who found intrinsic motivation in the form of enjoyment and pleasure promoted the use of the PC, and Compeau and Higgins (1995a; 1995b) and Igbaria and Iivari (1995) who found that self-efficacy can moderate an end-user's level and extent of PC usage.

Conversely and not surprisingly, while many of the attributes of an executives' personal use of the computer were seen as affording added value, some were seen as drawbacks to personal productivity. The drawbacks related to eight main categories with associated concepts (as shown in Map 7.7): the key ones were the categories labelled: 'pace of technological developments', 'making time to use the PC more effectively', 'creating senseless information'. These findings too support those of Boone (1991), Fisher (1992), King *et al.*, (1992), McKinnon and Burns (1992), Martin (1988) and Rockart and DeLong (1988).

Several executives (both users and non-users) spoke of their preference for paper, which supports both Zuboff's (1988) more general findings about the use of electronic media over paper, and those of Vandenbosch and Higgins (1995a) concerning EIS. There was evidence that those who preferred to 'flick' through paper often had a visionary (NT) MBTI core which is to some extent contradictory to Zuboff's (1988) proposition that the main problem relates to the lack of 'intellective skills', because as discussed in Section 3.9, it is the visionaries whom one might expect to be better at developing intellective skills (Herriot and Pemberton, 1995). However, there may be contextual factors, in that at least four executives were chauffeured and found this mode of transport much more compatible with the paper rather than electronic based reports. Not surprisingly, too, there was a high element of habit associated with the use of paper, which concurs with Vandenbosch and Higgins's (1995a) findings.

Overall it was found that executives' reasons for why and how they used the computer as a management support tool were primarily intrinsic to them as individuals. There was some evidence that in certain circumstances extrinsic factors could have an effect. This supports the findings of Ein-Dor and Segev's (1991) and Davis *et al* (1992), who found that at the individual level, the intrinsic variables were the primary factors to influence use.

The analysis of the different patterns of use shed some light on the questions of how and why but neither provided a complete picture nor explained fully the considerable diversity of use which was found, even amongst executives with seemingly similar roles and personality traits. For example, one would evoke the

use of the PC and manage by leading through action and people (Mintzberg, 1994) whilst the other chose to manage by their physical presence (Zuboff, 1988).

When executives spoke about how and why they used the PC, the value they derived from it and the drawbacks, their dialogue was invariably related to how they perceived they should perform the job and the associated roles, and their personal behavioural preferences. Not every executive performed every role, and, as indicated, their perception of which roles they should emphasise and how they executed these roles varied. Nonetheless it was this variation in their perceived roles, and the demands and constraints within which they worked, linked to their personalities and personal disposition as individual executives, which appeared to influence their computer usage.

Many authors, as discussed in Chapter 1, have proffered the view that information and communications technology would change both the content and nature of executives' work. Overall, there was evidence, as shown, that use of the computer has enabled some executives to make incremental adjustments to how they worked. Specifically they were able to:

- be more creative in terms creating strategy (as predicted by Leavitt and Whisler (1958) and Applegate *et al.*, (1988));
- be more self-sufficient and hence less reliant on external resources such as secretaries and subordinates, and hence more flexible about when and how they operated;
- delegate more (as predicted by Leavitt and Whisler (1958));
- enhance their preferred managerial role;
- create a different relationship with their secretaries, in which the secretary was increasingly becoming someone with whom the executive worked rather than someone who worked for the executive.

There was no evidence that even for the most expert and extensive users the computer had radically altered either the content or the nature of their work. However, their personal use of the computer had enabled these executives to:

- be more responsive and adapt to the externally changing business environment, and in particular, the need to work across different time and geographic zones;

- react more quickly to opportunities and problems, use the available resources more effectively, and operate across horizontal boundaries as well as the traditional vertical chain of command;
- influence the MIS culture from a position of expertise rather than status;
- add to their personal portfolio of expertise and hence enhance their career prospects both intra- and inter-organisationally.

9.2 A Proposed Model of Executive End-User Computing

9.2.1 Previous Models of End-User Computing - Their Limitations

In Chapter 2 several weaknesses were revealed with most models of previous end-user computing. First, as mentioned in Section 9.1.1, the use of the term 'use' is often ambiguous and treated as either one- or at most two-dimensional. Sometimes the term implies only a measure of level, and sometimes it implies both level and frequency, and it is not always clear to which the term 'use' is applied. This research has shown that for senior executives as end-users the term 'use' can be viewed as at least three broadly related constructs of which level is only one.

Second, previous models are primarily variable based, and whilst they have identified the factors influencing the acceptance and use of computers and especially PCs, they have not explained how and why these factors cause the variance. This may be why, as Newman and Robey (1992) point out, the results of such studies are often equivocal. Moreover these models imply that the linkages and interactions between the variable are primarily linear and consequential and to some degree consistent over time (for example, those of Davis *et al.*, (1989), Igbaria (1990; 1993; 1994), Igbaria *et al.*, (1995b), and Thompson *et al.*, (1991; 1994)). That is to say, whilst perceived usefulness may be moderated by computer anxiety, it is nevertheless always the main determinant of use.

Third, most previous research has been based on a single episode of use, namely current use, and there is an implicit assumption that use is consistent and in some ways static: once a user always a user. A notable exception is Martin (1988) who observed patterns of adoption and discontinuance of a DSS. The results of this study too have shown how executives' use of the computer is dynamic.

Fourth, previous models have mainly dealt with perceived usefulness and have often lacked reference to the users' personality and the context within which they operate. Some models that have their roots in the social psychological theory of either actioned reason (Ajzen and Fishbein, 1980) or behavioural intentions (Triandis, 1979) have attempted to take account of the users' personality, but this has mainly been in terms of sociodemographic variables such as age, gender and education. However, the results of this study, as shown in the cognitive maps (Maps 7.8 to 7.13 and 8.2) have shown that there is evidence to suggest that Jungian type personality attributes, as measured by the MBTI, can influence use and users' perceptions of the usefulness of this use.

Fifth, in the majority of previous studies senior executives have represented only a small percentage (usually less than 10%) of those studied, and have been treated as part of the total sample, except for those studies which have focused on EIS and DSS. Consequently it was not clear to what extent the results of previous studies of end-user computing reflected the nature of senior executives' work which, as discussed in Chapter 3, is different from that of middle and junior management and could hence be generalised to senior executives.

Consequently by and large many of the previous studies about senior executives as end-users have lacked context, especially in terms of explaining how and why these factors were conceived as either beneficial or drawbacks, and at times even as barriers to use. There are many characteristics which differentiate the senior executive from lower levels of management, but from this study the overriding ones which seem most pertinent to their use of computers are the discretionary environment, complexity and context in which they operate (Stewart, 1982; 1991). And the last two, as Barnard (1938) observed, are inextricably linked.

9.2.2 A Proposed Model of the Executive as an End-User

The purpose of this research was neither to prove nor dispute the validity of any one of the models, but rather to explore with as open a mind as possible what the processes and variables leading to use were from the senior executives' perspective. For example, perceived usefulness is undoubtedly a significant variable, but it must be seen within the full context of each executive's *modus operandi*. The results of this study indicate, as shown in Chapter 7 and the cognitive maps (Maps 7.8 to 7.13 and 8.2), that the key determinants which influenced senior executives' perceptions of the value of using a computer, and subsequent use, are primarily intrinsic to the executive and are their:

- perceptions about their managerial role;
- personality in terms of their Jungian traits as captured by the MBTI;
- perceptions about the benefits of using computers as management tools;
- perceptions about the drawbacks to being a user;
- previous computer experience (gained either by direct interaction or from managing the corporate MIS resource);
- positional resources resulting from their functional position (eg., resources to whom computer related tasks can be delegated and a chauffeur);
- perceptions about how easy computers are to use;
- self-efficacy;
- intrinsic motivation to use the computer.

Under certain circumstances, some extrinsic factors can influence the executives' use and in particular:

- MIS infrastructure;
- technological developments;
- external business environment;
- organisational culture.

In this study, the most frequently cited extrinsic factor (by users and non-users) was the MIS infrastructure in terms of the available technology, the user interface, the data quality, and the consistency and continuity of the software used. For example, in Executive D10's case (Map 7.13), the version of the word processing software he used was not compatible with the one used by his secretary and support staff. Also it was not corporate policy for all divisional personnel directors to have and use a computer in the way he used one. Nonetheless, whilst this moderated his use, it did not stop him using the PC. In Organisation M, the e-mail interface was acknowledged to be unfriendly and deterred some executives form using it, such as M2. M5 felt the facilities available on the e-mail were less sophisticated than he had been used to in his previous organisation, and this deterred him from using it. In the case of D2, D9, and F6 (Map 8.2), they perceived that the available corporate data did not meet their needs, and this was one of the reasons why they did not use the computer.

The other external factors which again, whilst less pervasive, were seen to influence a few executives' use were the organisational culture; the external business environment in terms of precipitating mergers and takeovers; and external technological developments. At the time of the interviews Organisation

M had just taken over its main competitor, whilst Organisation Q was undertaking a substantial restructuring and some executives such as M3, M8, M9 and Q4 had significantly increased work load; as a result their PC usage decreased.

Nonetheless, the data from these interviews suggest that overall these external factors are less influential than the intrinsic ones, as shown in Chapters 6 and 7. Those executives who wanted to use the computer (in whatever form) would do so regardless of the potential extrinsic obstacles, as illustrated by the comments from D8 in Section 6.7.3 Despite the fact that on arrival at her division of Organisation D there was no software and hardware of the level she had been used to, quite quickly she procured the tools she most valued.

The use (level, extent and continuity) executives make of computers, and especially the PC, is the net result of a complex interaction between these internal (and as appropriate external) determinants, all of which can either promote or restrain use. The analysis of the interview data suggests executives make their choice on either some form of contingency planning or force field analysis (Lewin, 1951) and sensemaking (Weick, 1995), in which consciously or not they weigh up these various factors in order to justify the use they make of computers to support them. This justification is linked to the executives' perceptions of the overall benefits afforded to them, in terms of the six categories of benefits explicated from the data Maps 7.1 to 7.6, and the overall downsides (Map 7.7 and 8.1), as shown in Chapters 6 to 8.

In Chapters 6 and 7 too, executives' use was seen to be dynamic. Specific encounters can cause them to change the level and extent of their use of the PC. This change can be either incremental in that they stay broadly within their existing boundaries of use, or the change may be revolutionary in that their use moves outside the existing boundaries of use. The move can be in either upwards or downwards directions and consequently executives' overall PC expertise can increase or decrease.

The interview data indicate first, these determinants influence the direction of use. Second, the extent to which any one determinant is influential, can vary at any given period in time according to the demands and constraints of the executive's work, and especially those related to the executive's managerial role, positional resources, and personality. For example, in some cases the overriding determinant promoting use was the need to fulfil certain role requirements, such

as leadership in terms of setting the organisational culture with respect to the use of computers. At other times the dominant force was intrinsic motivation to become competent. Conversely, in terms of diminished use, the dominant factor might be role related in terms of either a complete change of job or change in the content of their existing job, perhaps as the result of a merger with another organisation (internal or external).

Third, executives' perceptions of the value and indeed the drawbacks they obtain from their use of the computer were also seen to be dynamic and context sensitive. For example, at some point a key justification for use might be the need to be flexible. However, at times of extreme pressure of work, as discussed, this may no longer be an adequate justification in the light of other needs such as sorting out the basic business infrastructure. Any model of the senior executive as an end-user must therefore be dynamic and sensitive to the dynamics of the context within which they operate, and take account of:

- the multiple dimensions of use and, in particular, level, extent and continuity;
- the complex nature of the interaction between the key intrinsic determinants which can either promote or restrain the level, and the justifications for use;
- the fact that change in use can be incremental and revolutionary, and can represent an increase or a decrease in competence.

Manley (1975) proposed an equilibrium type model of the factors influencing clients' resistance to the implementation management systems. Based on this model, Martin (1986) suggested that the probability of a manager adopting a DSS could be expressed as a function of the sum factors for and against adoption.

Figure 9.1 shows a possible model of the senior executive as an end-user which is based on the preceding arguments and the models developed by Manley (1975) and Martin (1986; 1988). Each determinant of use, intrinsic and indeed extrinsic, can act as either a driving or restraining force, as summarised in Tables 9.1 and 9.2. Based on the results of the study, it is suggested that the dynamics of the model are best represented as a form of the punctuated equilibrium paradigm, as explicated by, for example, Tushman and Romanelli (1985) and more recently Gersick (1991), whilst the structure is shown as the 'rings' of an 'onion', as exemplified by Farbey *et al.*, (1993). The inner ring of the 'onion' thus represents the intrinsic determinants which appeared to be the more dominant, whilst the outer ring represents those extrinsic determinants which were generally of secondary importance. Whilst all the cognitive maps (Maps 7.8 to 7.13 and 8.2)

show some determinants related to extrinsic factors, such as the lack of critical mass of users, it is suggested that these are less pervasive and dominant than the intrinsic ones, such as the need to fulfil role-related requirements.

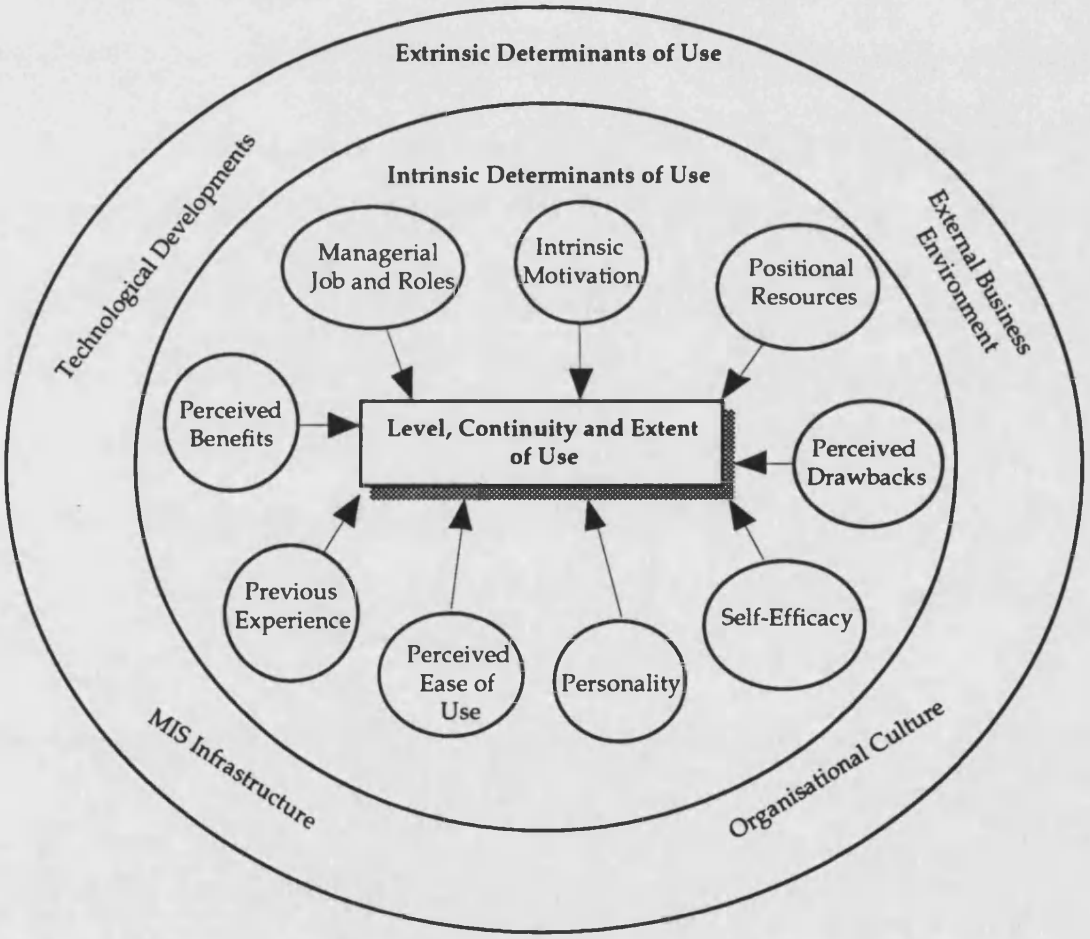
Table 9.1 Intrinsic Determinants of Computer Use as Driving and Restraining Forces

Determinant	Driving Computer Usage	Restraining Computer Use
Managerial job and roles	Leadership, the need to set the role model (C7 and F1).	Leadership, the need to lead by bodily presence (E1 and G3).
Personality	As an (NT), the need to model other possible solutions to a problem (C1). As an (ESTJ), the need to be in control and execute tasks as quickly and efficiently as possible (D1).	As an (NT), a preference for seeing only the whole picture, rather than detailed data (H2). As an (ESTJ), tradition and the need to be sure that use is justified (N1).
Previous computer experience	Personal use provided significant benefits, eg., improved personal productivity, and intrinsic satisfaction (P1).	Personal use or involvement (as a manager of MIS) did not provided an unequivocal view on the justification of using computers (F6).
Perceived benefits	Benefits either have already been obtained or can be perceived which encourage use (E4). In the case of a new user there may be a perceived need to change some aspect of their current managerial behaviour and mode of operation (D10).	No overall benefits can be perceived, perhaps because there is no perceived need to change existing managerial behaviours and modes of operating (E1).
Intrinsic motivation	There is an inherent interest in computers (L4).	No interest in computers (C3).
Perceived ease of use	Use is perceived as easy (H5).	Use is perceived as difficult (M2).
Perceived drawbacks	These are not perceived to outweigh the benefits, eg., time to learn to use the PC (P1); losing social contact (F1).	These are perceived as outweighing the benefits, eg., time to learn to use the PC (R5); losing social contact (F6).
Positional resources	Available resources, such as secretaries could be used more effectively, if the executive undertakes certain computer related tasks himself, eg., handling e-mail and preparing presentations (C7).	Resources are available to whom it would be more effective to delegate computer related tasks, eg., handling e-mail and preparing presentations (B3).
Self-efficacy	The executive has a high self-esteem about his own capabilities to use a computer, and consequently sees learning to use them as easier (M1).	The executive has a low self-esteem about his competence with the computer, perhaps as a result of benchmarking himself against an MIS professional and may see learning to use them as hard (D1).

Table 9.2 Extrinsic Determinants of Computer Use as Driving and Restraining Forces

Determinant	Driving Computer Usage	Restraining Computer Use
MIS infrastructure	Available tools and technology, eg., e-mail (F1).	User interface is unfriendly (M2); lack of corporate data (F6 and D9).
Organisational culture	Need to be self-sufficient and uses available resources very efficiently (C7).	Lack of a critical mass of users (F6, F1 and D10).
External business environment	Need to travel extensively (E5 and P1)	Takeovers and mergers (M3, M9 and Q4).
Technological developments	New software (D1 and E5).	Lack of consistency across different versions of the same software (C3 and D10).

Figure 9.1 Proposed Dynamic Model of Executive End-User Computing



To some extent such a punctuated equilibrium model was implicit in adopting and adapting Newman and Robey's (1992) methodology to explore how executives' use of the computer had changed. There was no evidence prior to this research that there would be definite episodic periods of use and disuse

other than the previous work of Martin (1986;1988) and Rogers (1983). It was only when these 'Use Over Time' Graphs were analysed in conjunction with the interviews that it became apparent that overall the way in which executives' use had developed was best explained in terms of the punctuated equilibrium model rather than some other model of change.

9.2.3 The Punctuated Equilibrium Model in General

Gersick (1991) posits that there are three components of punctuated equilibrium models: 'deep structure', 'equilibrium periods' and 'revolutionary periods'. Deep structure 'is the set of fundamental "choices" a system has made of (1) the basic parts into which its units will be organised and (2) the basic activity patterns that will maintain its existence' (p. 14). In this context the 'system' is the executive, the 'choices' are the determinants of use and related options therein, and the 'existence' is their use of the computer. Equilibrium periods are those 'during which systems maintain and carry out the choices of their deep structures' (Gersick, 1991, p. 17). They are therefore periods of stability. In contrast, revolutionary periods are periods during which 'a system's deep structure comes apart, leaving it in disarray until the period end, with the "choices" around which a new deep structure forms' (p. 20).

Revolutionary periods are generally short compared to equilibrium periods and are usually pre-empted by some incident (encounter) which causes the deep structure to become inappropriate and hence the formation of a new deep structure. Such episodes are generally unplanned and unpredictable. Furthermore, after a revolutionary period, the resulting period of equilibrium may leave the system (the executive) ahead or behind its original position (PC competence). Gersick (1991, p. 16) suggests that another critical difference between other models of change and punctuated equilibrium models is that, 'punctuated equilibrium models identify common choice categories, but allow for infinite variety in individual systems' particular choices' However, gradualist models tend suggest that the sequence of choice is always the same .

9.2.4 The Dynamics of this Model of Executive End-User Computing

The results of this study suggest that for periods of time (episodes) executives' competence and use of the PC are stable and fall within a certain broad band of use defined by all three components of use (extent, level and frequency). They are therefore either at or close to a particular node on the executive end-user cube. They could thus be regarded as being in a form of steady state equilibrium.

To reach this steady state executives have formulated a way of using the computer based primarily on the intrinsic options (represented by the inner ring) previously, as shown in Figure 9.1. In some cases the first point of use was based primarily on either an inherent interest in computers, or the demands of the job. This was especially the case when executives had been users for a long period of time (over ten years) and may have only been middle managers.

Regardless of what initially motivated executives to use the computer, there follows a period during which the depth and breadth of software used, and the extent (tasks for which the software is used) may vary slightly, either upwards or downwards, but not dramatically (a good example would be C7 and D1, as discussed in Chapter 7). Executives' rationale and justification for their use of the PC were determined by evaluating the merits of the available options. Whilst the significance of these may change over time, the net overall interaction and hence deep structure of their value system leave them operating within their original boundaries. This equates with the second component of the punctuated equilibrium model, namely a period of equilibrium, during which an executive maintains the status quo of his system (in this case his *modus operandi*) and his chosen deep structure. Any changes were incremental rather than revolutionary.

Some executives remained in this initial state of equilibrium with respect to their PC usage, namely the steady state low level users. For others there was an encounter which caused 'revolutionary change' in how they used the PC, either upwards or downwards. As discussed, the most usual trigger was either a change in job or substantial technological advance, which created the opportunity to change how the computer could be used. This equates with the third component of the punctuated equilibrium model, a period of revolution during which the deep structures are dismantled and must be reformed before a period of stability ensues again. This revolutionary period can be regarded as a transition from old to new values and beliefs and deep structures.

Taking first those for whom it is a significant move upwards in terms of the way in which they incorporate the use of the PC into their *modus operandi*. This is best encapsulated by these quotes from E4: '... that's when I started to realise what it could actually do for me in terms of presentations, in terms of communicating with people ... once I got my own machine that's when it (use) sky rocketed'. The encounter is mainly the arrival of new technology and it is mainly the level and frequency which increased. However, the short period of equilibrium was followed quite quickly by another period of revolution prompted by a job change, after which E4 said, '... that's when

my use increased dramatically...' His extent, level and frequency of use changes and he moves from being a medium level user to a high level user. He has reset his deep structure, as shown in Chapter 7, and his use of the computer is no longer an adjunct to his managerial behaviour, but an integral part of how he operates, and he is yet again in a period of equilibrium.

For some the transition results in diminished use of the PC and they become declining users. In this case there is an overall negative net value in terms of the sum of the available choices. The perceived drawbacks to their personal use of the computer in effect outweighed the benefits for the context within which they now find themselves working.

By and large, as indicated, the episodes which cause these revolutionary periods are unpredictable and rather like an electric impulse. They provide short sharp shocks to the system which disrupt the deep structure. One could argue that an executive can plan for a change in job, but as Stewart (1982; 1991) points out he may not be able to predict the overall effects of the change in content and context. In some cases there was evidence that the episode which punctuated the equilibrium was premeditated in terms of the executive making a decision either to learn to use the computer or further develop his competence (examples being D10 and E4). However, they may not have anticipated how these new competences could enable them to change their *modus operandi* which subsequently precipitated a change in their 'deep structures'.

The analysis of the data suggests that menu of choices from which executives form their 'deep structures' remains the same regardless of level and extent of use; but, the significance of any one item may vary. A comparison of F1 (Map 7.8), a low level user, to C7 (Map 7.10), a medium level user, and D10 (Map 7.13), a high level user shows that all three feel the concept of establishing the role model is a reason for using the PC. However, the significance of this determinant may be different for each of them, as shown in Chapter 7, and hence have a different influence on the sequence and manner by which they make the choice which leads to the formation of their 'deep structure' (use of the computer).

In terms of personality, as Lewin (1938) postulated, and the theories of reason, action and behavioural intention imply, a person's behaviour is a function of his personality and his environment. Although personality traits are regarded as enduring, their strength may be modified over time as a result of the person's

environment and development (Anastasia, 1976; Gardner and Martinko, 1996; Myers and Myers, 1992). An individual who might at an earlier point in his career have been an INTP (an introverted thinker supported by intuition) may shift to an ENTP (an extraverted intuitive supported by thinking) as a result of the nature of his job. Although the core processes remain the same, subtle shifts in strengths of the four constructs can cause subtle shifts in emphasis of the dominant process and where those preferences are focused. This point is perhaps best illustrated by Mintzberg's (1989) proposition that executives are not necessarily born 'creative strategic planners', but because they spend much of their time on this activity they develop this ability. Thus, again, the determinant of use of 'personality' is still on the menu, but its influence may change.

In certain circumstances the extrinsic factors, represented by the outer ring in Figure 9.1, can significantly influence the executives' use of the computer. As with the intrinsic factors, these extrinsic determinants will have always been on the menu of choices from which the executives' 'deep structure' is formed but at times they may become more influential. For example, a change of job may mean that as a result of the new MIS infrastructure, the level of available technology is less than in the previous job; thus this extrinsic option (determinant of use) may assume more influence. The external business environment may have prompted changes in organisations' structure and business processes, through a merger or takeover bid, as in the case of Organisations J, M and Q. Consequently, as discussed, a few executives found they had significantly increased work loads, such that despite their desire to use the PC, executing the content of their current work load became the overwhelming factor (eg., M3, M9 and Q4).

The punctuated equilibrium paradigm has enable the findings of this research concerning executives' use (in terms of level, extent and continuity) of computers and especially PCs to be explained more fully within the context of the nature of their work. It also enables account to be taken of forwards and backwards moves in terms of computer usage, that is, increased and diminished competence with the computer. It highlights the fact that for executives there is no universal dominant determinant influencing them to use the computer, and which can account for the majority of the variation of their use, such as perceived usefulness. Rather there is a group (menu) of common determinants from which the executive can choose, and depending on the content and context within which they are operating, different determinants may dominate. However, the intrinsic determinants tended to be the more enduring and dominant.

By using the Grounded Theory Approach, and in particular the proposition of analysing instances which represent the extreme positions of the phenomena being observed (ie., low and high levels of computer usage) one is able to develop a more substantive theory and model which holds for the whole class of the phenomena (ie., all executive end-users) rather than just one subset (eg., either low or level users).

9.2.5 Other Aspects of this Proposed Model of Executives as End-Users

The proposed model nonetheless leaves certain questions unanswered, such as the following.

- Do the more advanced users go though certain definite phases and sequences of events in order to become more competent?
- If so, is there a correlation between these and the organisational phases of end-user computing, such as those posited by Nolan (1973)?
- What processes do executives use to form an opinion about their justification for using a computer?
- In what way do these determinants interact? Is there a specific pattern?

Interestingly, Levinson (1978, p. 49) posits that each revolutionary period ('transition phase' as he calls them) is different and requires attention to different skills and tasks. Clearly during executives' first period of use the main emphasis is on acquiring a basic set of computer competences and a knowledge of 'how' and 'that'. For those who become more competent users there is evidence that they move through a second (and perhaps third and fourth) phase of development during which they may be placing more emphasis on developing their ability to 'know beyond' and apply their competence to a more general set of tasks. This may explain why some executives never become more than novice users and why some become declining users as they never make this transition. This would be consistent with Rogers's (1983) findings about innovations. Perhaps developing a knowledge of 'beyond' (or 'principles' in Rogers's (1983) terms) is a prerequisite for progressing to the next level of use. This is by and large speculative and the answer to these questions would need further research which was beyond the scope of this study.

9.2.6 The Executive as an End-User - A Grounded Theory

Based on the findings of this study, the executive as an end-user can be summarised as follows. Executives' use of computers, and particularly the PC, is based on complex interactions between a number of primarily intrinsic factors, the key ones being their perceptions of their job and the associated managerial roles and processes, the context within which they work and their underlying Jungian personality attributes. Some extrinsic factors can have a significant impact under certain circumstances, especially the MIS infrastructure, and in particular the user interface of corporate systems, the continuity and compatibility of the range of software provided, and the quality of data. The executive as an end-user can best be understood as a punctuated equilibrium model in which significance of these determinants and their interactions can vary at any given period of time according to his job and its demands and constraints and hence the context within which the executive is working.

Glaser and Strauss (1967) and Strauss and Corbin (1990) posit that first a grounded theory should fit a substantive area of study. In this case the area is the senior executive. Second, any theoretical frameworks and concepts should be sufficiently general to be applicable to a range of situations. All the executives' patterns of either use or non-use could be explained in terms of the frameworks and models developed from this data. Third, any theories and concepts should be readily and easily comprehensible to the practitioner. As will be shown in Section 9.3, some of the output from this research has been applied within the National Heath Service to support the development of managers' competence with information management and technology.

9.3 Practical Applications of this Research

To support the process of finding suitable senior executives to interview, various press releases were issued about the project. In response to one of these, the NHS Training Division (NHSTD) approached this researcher. As part of their Enabling People Initiative the NHSTD had implemented a national Information and Management (IM&T) education and training programme for all managers. There is a very diverse range of managerial jobs within the NHS, perhaps more so than in many other organisations. For example, there are those who have responsibility for administration functions and within these the content and emphasis of the job can be quite diverse, and those who have some medical and clinical responsibilities.

The NHSTD was therefore concerned with firstly how they could assess managers' IM&T training needs and hence design the most suitable and cost effective training programme, and secondly how to monitor and evaluate the outcomes of their IM&T training initiatives. A joint project was established to develop a self-assessment training needs analysis instrument which would enable managers' IM&T existing competences to be profiled, and based on the profile a development plan was devised.

The instrument was developed, based on the IM&T organisational context and culture within the NHS and the data emerging from this study in terms of the determinants and processes known to promote and conversely inhibit senior executives' personal use of computers. The instrument (a self-assessment questionnaire which is computer marked) was formally launched in June 1995 and the initial results in many ways mirror the findings of this study (Seeley *et al.*, 1996; Seeley and Mordue, 1996). Several other organisations have subsequently expressed an interest in the outcomes of the this study and in at least two cases work has been initiated to help them develop IM&T management education programmes.

9.4 Contributions of this Study

It is suggested that this study has made the following contributions to the field of both management and MIS research.

1. Synthesised the epistemologies of management and MIS in order to provide a better understanding of the way in which executives use computers and especially PCs as management support tools.
2. Extended the existing knowledge base of both end-user computing and EIS to help provide an understanding of the executive as an end-user.
3. Provided a further example of how interpretive and qualitative research methodologies can be used successfully within the MIS field.
4. Added to the group of studies which make use of both process and variable research methodologies.
5. Developed a model of executive end-user computing which takes account of the complex content and context of the executives' function and which can be used by practitioners and researchers.
6. Highlighted other areas for future research on this topic.

9.5 Limitations of this Research

No research is without its weaknesses and limitations (Bryman, 1988; 1992). The principle weaknesses of this research lies to some extent in its strength, namely the qualitative interpretive nature of this study. Moreover, in a piece of research there is always some trade-off between the ideal and needs of the various stakeholders. In this case a significant concern was to design a piece of research that would be of practical use to this researcher's sponsors, and be suitable for a doctoral thesis. The main weaknesses of this study are as follows.

1. Interviewee bias - in some cases undoubtedly the researcher was being told what the executive felt she wanted to hear.
2. Executives are poor estimators of how they spend their time and how proficient they are.
3. Specifically within the field of MIS there has been some debate about the reliability and validity of self-reporting measures of computer usage as opposed to electronic measures although in this case the latter was not really a viable option. However, as there seems to be some degree of consistency and continuity over what the executives reported this was not regarded as a serious problem.
4. Objectivity and bias on the part of the researcher - despite trying to be as open and subjective as possible there is always an element of bias in an interpretive study such as this, not least as a result of the researcher's personal ontological and epistemological roots (Burrell and Morgan, 1994; Hirschheim *et al.*, 1991; Zuboff, 1988).
5. Linked with the above is the way in which mental maps, both one's own and those of others, influence a researcher's thinking and the way the researcher interprets the data (Doyle, 1991; Weick, 1990a).
6. As a consequence of the rapid rate of change and technological developments within the field of information and communications technology, some of the outcomes of this study may be transient. For example, at least fifteen executives spoke about the likely impact of voice activated computers and felt that when this was available they would use the PC more. In this context the research might have benefited from the inclusion of a longitudinal case study.
7. There were no female non-users and consequently this may limit the conclusions with respect to gender differences.
8. The majority of the organisations had a traditional hierarchical organisational culture, and were very large.

It is hoped that any bias in terms of organisational and sector specifics was minimised and assumed away by the number and spread of the organisations and executives within them. A corollary limitation of this study may be the limited comparative analysis across organisations and functions. Again, this is an area where the results of previous studies have been equivocal. As there was no obvious evidence to suggest that this was a significant issue in this study, this was an area which was therefore not explored. It could be argued, too, that only those who were interested in the computer were interviewed, but the range of continuity, level and extent of use reflected by these executives suggests that this sample is representative of the senior executive population as a whole within large organisations.

9.5.1 Areas for Future Research

By using research methodologies developed by other practitioners, and building on the work of other researchers in both the field of management studies and MIS, this study has, this researcher hopes, contributed to the epistemology of the field of MIS and management development, and in particular the senior executive as an end-user. It has also highlighted some areas for further research and in particular:

- estimating of the real cost benefits of a senior executive as an end-user;
- developing end-user education and training which is more suited to senior executives' needs and environment;
- exploring how executives could optimise and maintain their expertise with the computer such that any decline regardless of duration and depth minimises the investment in re-learning;
- determining the directions and strengths of the relationships of the variables which influence senior executive's personal use of the computer;
- determining how representative these finding are to other organisational cultures and sizes.

9.6 Summary and Conclusions

The results of this study have been based on a qualitative analysis and interpretation of the interview data obtained from eighty five senior executives drawn from sixteen different organisations. The methodological principles of Grounded Theory and Process Analysis were used to guide both the data

collection and analysis phases. From the enormous volume of data which was generated one major theory emerged.

Executives' use of computers, and particularly the PC, is based on complex interactions between a number of primarily intrinsic determinants, the key ones being their perceptions of their job and the associated managerial roles and processes, the context within which they work and their underlying personality attributes. The most frequently cited extrinsic factor which can have a significant impact under certain circumstances is the MIS infrastructure. The rationale of the executive as an end-user can best be understood as a punctuated equilibrium model in which the significance of these variables and their interactions can vary at any given period of time according to the executive's job and its demands and constraints and hence the context within which the executive is working.

The white hot revolution in terms of the content and nature of managerial work predicted by Leavitt and Whisler (1958) and others such as Applegate *et al.*, (1988) may still be some way off. Nonetheless, the results of this study showed that executives are making more extensive use of the computer as a personal productivity tool to support them in their senior executives' roles than has been found in previous studies. It is uncertain whether or not these executives' use of the computer, and especially the PC, is in a manner which is either optimal or cost-effective. Moreover, the computer may not have revolutionised either the content of their work or the context within which they work, but it has enabled them to make small incremental changes and in particular adapt more quickly and readily to some of the external pressures of the current business environment. On balance the users, regardless of level of use, felt the benefits outweighed the drawbacks and felt that they would remain users for the foreseeable future.

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Appendix A - The Myers-Briggs Type Inventory

1. Introduction

Jung (1923) proposed that individuals have a preference for how they use their minds in terms of their preference for 'perception' (gathering data) - either sensing (S), or intuition (N) - and 'judgement' (forming conclusions about what they have perceived) - either thinking (T) or feeling (F). They also have a preferred 'attitude' which reflects their preference for being 'energised' either via introversion (I), the inner world of thoughts and ideas, or extraversion (E), the outer world of people and things. Moreover, Jung (1923) asserted that individuals develop a dominant function where their preferences are directed and an auxiliary as a counterbalance. Myers (1962) added a fourth dimension, individuals' orientation for dealing with the outer world, either through judging (J) or perceiving (P). Myers (1962) suggested that the preference for J or P also determined which of the core processes, perception (S/N) or judgement (T/F), is dominant. She reasoned that since Es focus on the outer world, the JP preference directly indicates their dominant function. Conversely, for Is because the J/P dimension is the preference for dealing with the outer world, their dominant function is the reverse of their J/P preference.

2. Influence of the Dimensions in Work Situations

Table 1 summarises the influence of each of the four dimensions of the Myers-Briggs Type Inventory (MBTI) on a person's preferences within the work environment. Based on these four dimensions, there are sixteen individual profiles in which one of the core dimensions (perception (S/N) or judgement (T/F)) will be dominant whilst the other will be the auxiliary function, as shown in Table 2. As indicated above, with an extravert, the dominant behaviour is the one the outside world observes. For example, for an ESTJ the dominant function is sensing (S) and sensing is what they show and use to deal with the outer world. Their strength is in deciding about things in the outer world using hard facts. The auxiliary thinking (T) function will be used primarily to deal with the inner world and says something about how they make decisions.

Conversely, introverts keep their dominant process for dealing with the inner world and show their auxiliary function to the outer world. For example, for an INTJ the dominant function is intuition (N), and they will use this to make decisions but show the outer world a preference for thinking (T).

Table 1 Influence of MBTI Preferences in Work Situations[1]

Extraversion	Introversion
Like variety, action and people	Like quiet for concentration
Good at greeting people	Have trouble remembering names
Are fast and dislike complications	Are careful with details and dislike sweeping statements
Interested in the results of their job and getting it done	Interested in the ideas behind their job
Don't mind interruptions	Dislike interruptions when working on a project
Develop ideas by discussion	Develop ideas by reflection
Communicate freely	Feel inhibited when communicating
See information as public property	See information as private property
Inclined to act - think - act	Inclined to think - act - think
Sensing	**Intuition**
Dislike new problems unless they can be solved using existing methods	Like solving problems
Like established ways of doing things	Dislike routine
Enjoy using existing skills more than learning new ones	Enjoy learning new skills more than using them
Patient with routine detail	Impatient with routine detail
Rarely get inspired and distrust their inspiration	Follow their inspiration
Seldom make factual errors	Sometimes get the facts wrong
Proceed step by step	Work in bursts of energy
Like things with a practical slant	Like things with an innovative slant
Like to present the details first	Like to present the whole picture first
Thinking	**Feeling**
Use logical analysis to reach conclusions	Use values to reach conclusions
Relatively unemotional and uninterested in people's feelings	Are aware of people's feelings
Make decisions with little or no recourse to people's feelings	Let feelings, their own and others, influence decisions
Look at the principles underlying an issue	Look at the values underlying an issue
Feel rewarded when a job is well done	Feel rewarded when people's needs are satisfied
Judgement	**Perception**
Work best when they can plan their work and work to their plan	Enjoy flexibility in their work
Like to get things settled and completed	Like to leave things open for last minute changes
Seek structure and plans	Good at adapting to change
May not notice new tasks which need doing	May postpone unpleasant tasks which need doing
Are satisfied once they reach a conclusion on an issue	Are curious and welcome new light on an issue
Make decisions too quickly and do not notice new and relevant information	Postpone making a decision while searching for options

Notes: (1) After Myers (1985) and Hirsh and Kummerow (1990)

Table 2 Dominant and Auxiliary Functions

Extravert Types and Typical Vocations[1]	Dominant Function	Auxiliary Function	Introvert Types and Typical Vocations[1]
ESTP - Customer Service	Sensing	Thinking	ISTJ -Accountant
ESTJ - General Manager	Thinking	Sensing	ISTP - Business Analyst
ENTP - Entrepreneur	Intuition	Thinking	INTJ - Chief Executive
ENTJ- Field Marshall	Thinking	Intuition	INTP - Consultant
ENFP - Journalist	Intuition	Feeling	INFJ - Author
ENFJ - Teacher	Feeling	Intuition	INFP - Campaigner
ESFP - Sales Executive	Sensing	Feeling	ISFJ - Civil Servant
ESFJ - Sales/Service Manager	Feeling	Sensing	ISFP - Artist

Notes: (1) Adapted from Keirsey and Bates (1984)

The MBTI is about preferences rather than right or wrong and therefore the extent to which these preferences influence a person will depend on the strength of the preference. The general strength of a score is shown in Table 3. The stronger the preference, the more likely one is to use that mode of the dimension and the less likely one is to use the opposite mode. For example, an individual with a 'very clear' preference I, may find it harder to operate in an environment which requires spending a considerable amount of time dealing with the outside world, ie., people.

Table 3 Strengths of MBTI Preferences

Score	Preference Strength
1 to 5	Slight
6 to 10	Moderate
11 to 20	Clear
21+	Very clear

3. Individual Profiles

Based on Myers and Myers (1980), Hirsh and Kummerow (1989) and Keirsey and Bates (1984), this section provides an overview of the six most common profiles found in this study, ESTJ, ENTJ, INTP, ISTJ, ENTP, and INTJ.

3.1 Extraverted Thinkers ESTJ and ENTJ

Key descriptors: efficient, critical, challenging, decisive, direct, fair, logical, impersonal, objective, organised, practical, responsible, structured, systematic.

The dominant process is thinking and these people are characterised by their preference for using their thinking to run as much of the world as is theirs to run. They are in their element when outside situations need to be organised, criticised or regulated. They abhor confusion, half measures and anything that is aimless and ineffective. Consequently they are often crisp disciplinarians who know how to be tough if the situation demands it. Extraverted thinkers tend to be action and task oriented, quick to take charge and decisive about what they consider needs doing. As a result they often directly pursue leadership roles and find it hard to be followers unless they perceive that the person they are following is more competent than they.

3.1.1 ESTJ - Execution Saves the Job

The main difference is that the ESTJs look at the world with sensing rather than intuition (as do ENTJs). They are interested in the realities of the situation as they perceive it through their five senses, and hence tend to be very matter-of fact and practical. ESTJs tend to role up their sleeves, and proceed to get the job done directly. The ST core means they like tradition, and don't make changes unless they are really justified. Decisions are based on practical realistic criteria and are unlikely to chance something that seems uncertain and frivolous. They often stay in their organisation for a long time. Their style is to set goals so they can clearly see when a job is completed. Efficiency is of the utmost importance to an ESTJ. They prefer well-structured environments such as bureaucracies where they can use the policies and procedures to get things done. Their weakness is their overwhelming desire to get things done: they may make decisions too quickly, and not see the need to change. Whilst they may be good at 'knowing how' and 'knowing that', they may be weak at 'knowing beyond'.

3.1.2 ENTJ - Executives Need Tough Jobs

ENTJs look at the world through intuition (N) and are more interested in the possibilities beyond the present and most obvious. They are always scanning the external environment for ways to put themselves and their organisations ahead. They are constantly seeking the most strategic way to organise and accomplish a task, and hence are mindful of how they use their resources. Like the other NTs they prefer to focus their attention on the big picture rather than the detail. They are goal focused and good at taking a global perspective. They like to ask questions to help them think through what is the real problem and because of this may be better at 'knowing beyond' than their ESTJ counterparts, and will be

less rigid than an ESTJ. Their weakness is their directness and susceptibility to overlooking detail and practical considerations and constraints.

3.2 Introverted Thinker INTP - It's Not Theoretically Possible

Key descriptors: autonomous, critical, demanding, firm, global, logical, private, original, theoretical, systems minded, visionary.

Introverted thinkers (ISTPs and INTPs) use their thinking to analyse the world rather than run it. Their reliance on thinking makes them logical, impersonal, objective, critical and not likely to be convinced by anything but reason. As introverts, they focus their thinking on the underlying principles rather than on an artefact itself. As it is hard for them to switch their thinking from ideas to the detail of daily life, they lead their lives through their preferred perceptive process, which makes them detached, curious and quite adaptable, at least until one of their underlying ruling principles is violated, at which time they stop adapting.

The INTP with a preference for P will be more inclined to see things in terms of 'may' and 'could' rather than 'ought' and 'should', as does the INTJ who is driven by an inner vision rather than an inner thinking process. Otherwise they are very similar in nature; like the INTJ, the INTP strives for logical purity and often rebels against rules and regulations. They are relentless learners in areas that interest them. They are better suited to cultures where there is less emphasis on the rules and regulations, and where they can use their intuition. Their weakness is their propensity to focus on the negative and inconsistent aspects of a situation and they may be perceived as aloof.

3.3 Introverted Sensor ISTJ - I Save Things Judiciously

Key descriptors: dependable, duty bound, factual, organised, painstaking, practical, realistic, reliable, sensible, steadfast, systematic, thorough.

Introverted sensors (ISTJs and ISFJs) are remarkably dependable as a result of their total combination of preferences. They use their preferred process of sensing in their inner world, and base their ideas on a deep, solid accumulation of stored impressions which gives them an almost unshakable belief in their own ideas. They use their preferred type of judgement (T or F) to run their outer life.

Typically ISTJs learn best and apply themselves most carefully in subject areas that are practical and useful They like information that is precise and accurate. They get things done on time and believe in thoroughness. They pride themselves in being organised but often feel they are not as good as they could be. ISTJs do not often seek leadership roles but are often placed in them because of their dependability. They believe leisure should be earned and like to schedule their leisure activities. Their downside includes getting lost in the details (rather than seeing the big picture) and overlooking the interpersonal aspects of relationships such as directly giving people compliments. They may give compliments, but might prefer to do so using a written channel of communication, eg., e-mail.

3.4 Extraverted Intuitive ENTP - Every New Thought Propels

Key descriptors: adaptive, analytical, challenging, clever, creative, enterprising, independent, outspoken, questioning, resourceful, strategic, theoretical.

The interest, enthusiasm and energy of the extraverted intuitives (ENTPs and ENFPs) tend to pour into unforeseen channels like flash floods. They tend to sweep everything and everyone along with them, overwhelming any potential obstacle and carving out a path which they expect everyone to follow, long after they themselves have moved on to another idea. The force that animates extraverted intuitives is neither conscious will power (for example like the ENTJ) nor a planned purpose (as in the case of say an ESTJ), but rather a perceptive energy and vision of what might be. A vision of the possible has an irresistible pull for extraverted intuitives. Not surprisingly, they tend to be stronger than their extraverted thinker counterparts at 'knowing beyond.'

ENTPs are known for their quest of the novel and complex. They have faith in their ability to improvise and overcome any challenge which faces them. They rarely accept things as they are, and like to test and explore to see new meanings and relationships. Their byword is 'keep your options open' (Hirsh and Kummerow, 1989, p. 247). Competence is important to an ENTP and they will only accept training from those they perceive as competent. Like the INTP they too are relentless learners. They tend to focus more on the big picture and see details as unimportant. As leaders they encourage independence in those that they lead, and are good at generating enthusiasm for new approaches, but they often need subordinates who can attend to the detail behind their ideas. Their

weaknesses are fear of being seen as incompetent and lack of attention to detail and the realities of the here and now.

3.5 Introverted Intuitive INTJ - It's Not Thoroughly Justified

Key descriptors: independent, critical, systems minded, visionary, demanding, global, logical, original, firm, theoretical, private, autonomous.

Like all introverts, the introverted intuitives' (INTJs and INFJs) outward personality is strongly influenced by their auxiliary process. They are driven by their inner vision. Their greatest strength comes from their intuition which can be like a flash of inspiration, and can provide them with an insight into relationships between ideas and a strong ability to 'know beyond'. They are insightful, and mentally quick, but this may not be visible to the outsider, bearing in mind their preferred world of their own. Indeed, unlike their extraverted intuitive counterparts, unless their auxiliary judging process is well formed their inspirations may never be either seen or applied to the outer world.

INTJs have a firm set of beliefs in which they have great faith. They dislike authority, because it may be seen as counter to their beliefs about how things should be done. As expected for an I, they do not rate being sociable very highly; they only hold meetings when it achieves a purpose. They will be frugal with their time and resources unless they are used for something which they support as part of their value system. They are often thirsty for knowledge and will be resourceful in obtaining it. As leaders they will design systems and models to achieve the organisational goals. They are tough minded and drive themselves and others too. INTJs are the most self-sufficient of all the sixteen types and take more or less conscious pride in being so. Their weakness is that because of their dislike of social interactions their visions may not always be well founded in reality. They may not be too conscious of other people's feelings, and may be seen as detached and unapproachable.

Appendix B - Development of the Executive Interview Guide

As described Section 4.3, six broad areas were identified around which data would be collected during each interview as summarised below.

1. Sociodemographic data;
2. Experience with PCs;
3. How the competence with the computer was gained;
4. Benefits (and drawbacks) of personal use of the computer;
5. Organisational norms;
6. Future plans for use of the PC.

This appendix gives details of the rationale behind each set of questions, eg., previous research upon which a specific question was based.

1. Sociodemographic Data

The purpose of this set of questions was to gather general background information about the executive and his role and responsibilities within the organisation.

Q1.1 to 1.3 General data on age and gender.

Q1.4 Educational experience is included because there is some evidence that those with a higher level of education are more likely to be favourably disposed to using the computer (eg., Davis and Davis, 1990; Harrison and Rainer, 1992; Lucas, 1978). There is also some indication that those having either a technical or financial disposition are likely to use the PC more extensively.

Q1.5 to 1.8 These were designed to check the level of seniority in keeping with the operationalisation of the term *senior executive*, as defined in Section 1.4.1, namely, a senior executive should have:

- a major role in setting the policy/strategy of the organisation;
- other senior managers reporting to them;
- influence over the strategy for their division/department.

Q1.9 and 1.10 General background information on career path to date.

2. Experience with PCs

The aim of this set of questions is first to illicit the extent of the executive's current competence with the PC (range and depth and breadth of applications used); second to explore the types of tasks the PC is used to support, in terms of the nature of managerial work (as proposed by Hales, 1986; Isenberg, 1984; Kotter, 1982 and Mintzberg, 1973) and third to explore when and where the executive uses their PC.

Q2.1 to 2.5 Type of PC used, ease of access and frequency of use.

In the past, a deterrent to using the PC might have been lack of one's own PC (Gross *et al.*, 1971). Conversely, direct access which allows one to 'play' can act as an enabler (Webster and Martocchio, 1992).

Ein-Dor and Segev (1991) found that intensity of use initially increased over the first decade of use and then declined. They suggest this relates to changes in job requirements, cognitive style, motivation, attitudes and involvement and personal characteristics, but give no specifics.

Q2.6 Tasks supported by the PC. The purpose of these prompts was first to investigate the tasks for which the executive is using the PC as per the literature on the nature of managerial work discussed in Chapter 4 and specifically that of Isenberg (1984), Kotter (1982) and Mintzberg (1973). Tasks were expected to include communications, networking, presentations, planning, controlling resources, managing resources and projects, developing and modelling ideas, etc.

The frequency and complexity of the tasks are known to influence usage. Culnan (1983) found that where a task was performed frequently the users were more likely to use the PC themselves. Conversely, where the task is performed infrequently, the user is likely to be a 'chauffeured user', relying on someone else to interface with the PC.

Q2.7 to 2.12 These were to assesses the range of software packages used and the executives' depth and breadth of expertise with the packages. There is a tendency for less experienced users to employ a limited range of software for all purposes, eg., a spreadsheet, regardless of whether or not it is the most suitable

package (Mason and Willcocks, 1991). The more experienced users would be expected to use a wider range of software (Igbaria *et al.*, 1989; Lee, 1986; Rainer and Harrison, 1993; Schiffman and Meile, 1988).

Q2.13 and 2.14 The degree of involvement and ownership during the development cycle can influence perceived usefulness (Franz and Robey, 1986; Lucas, 1978),

Q2.15 Perceived usefulness has been found to influence use (Davis *et al.*, 1989) Specifically, Martin (1988) found one of the main reasons why executives gave up using their DSS was because the output no longer met their needs.

Q2.16 Control over allocation of IT resources. This is one of three factors used by Amoroso (1992) to define end-user types. It may be of interest in this study.

3. How Competence with the PC was Gained

The aim of this set of questions was to explore how the users acquired their current level of expertise and what factors either motivated or inhibited their learning. On the one hand this section is about checking some of the variables known to influence the acquisition of end-user skills, and on the other hand exploring the processes the executive went through in terms of encounters and episodes and their outcomes (Newman and Robey, 1992). As Newman and Robey (1992) point out in respect of the user-systems analyst relationship, much is known about the variables which predict outcomes but less is known about the how and the why. This section of the interview was designed to explore this aspect.

Q3.1 The executive was asked to reflect back over time from his first attempt to use a PC to current day use and draw a graph as the starting point of the discussion, using the 'Use over Time' template.

Q3.2 The aim was to identify the executive's main source of training and education about PCs. Formal training has been shown to influence use (as discussed in Section 2.3.2). Nonetheless, Lee (1986) found support from colleagues to be the most important source of learning.

Q3.3 to 3.7 The factors which can influence use are known, but not the why and the how, as discussed in Chapter 3. Based on the literature survey and the nature of managerial work, specific factors of relevance to executives might include the fit of training method to the executive's needs, organisational culture, level of MIS support and availability of resources, and the fit between information provided from the system and the executive's needs, the PC's perceived ease of use and perceived usefulness. There is evidence to suggest that the degree of influence of the factors varies with user level, the more experienced user being less influenced (Culnan, 1983; Thomson *et al.*, 1991). Ein-Dor and Segev (1991) also found that the reasons for use and the use made of any output is differentially associated with the degree of end-user computing.

4. Benefits (and Drawbacks) of Personal Use of the PC

Perceived usefulness is seen as one of the main predictors of use (Davis *et al.*, 1989; Igbaria, 1990). Much is known about the benefits of the PC to middle managers and clerical workers. The aim here is to explore what senior executives see as the benefits, given the context within which they work, as discussed in Chapter 4. From the literature on middle managers, and the work of senior executives, benefits might include:

- being more self-sufficient;
- currency and accuracy of information;
- support with the structured tasks, leaving more time for the less-structured tasks (Isenberg, 1984);
- saving time (Mintzberg, 1973);
- creating a more professional approach;
- being more productive (Boone, 1991; Nelson, 1989);
- gaining competitive advantage over colleagues;
- supporting specific roles (Mintzberg, 1973), eg., resource allocator
- career moves;
- modelling ideas (Mintzberg, 1973; Isenberg, 1984);
- thinking creatively (Isenberg, 1984);
- developing agendas and networks, something Kotter (1982) suggests, and for which Boone (1991) found evidence.

Q4.1 to 4.5 Explore the benefits, the order of importance placed on them by the executive, and whether these benefits have changed over time.

Q4.6 to 4.8 Explore any downsides to using the PC. For example, lack of personal contact upon which many executives place a high value (Mintzberg, 1973; Kotter, 1982), less need for a secretary, who is seen as a status symbol (Boone, 1991), and disinformation (Weick, 1985).

5. Organisational Norms

The socially accepted practices within an organisation are known to influence use. Specifically, Thomson *et al.*, (1991), found they exert a stronger influence on the less experienced user. This section looks at these factors. There is a range of other organisational factors which can affect use (as discussed in Section 2.3.1) but for the purposes of these interviews it is assumed that firstly, these can be controlled by senior executives, and secondly, if there are specific factors of importance, they will come out in the interviews.

It is assumed that detailed background information on the MIS and human resource policies and strategies would be obtained separately before the executive's interview from either the sponsor or the appropriate members of the organisation, eg., personnel manager.

Q5.1 to 5.4 Explore the organisation's norms as regards the use of PCs by their peers, the CEO and their subordinates.

Q5.5 to Q5.7 Explore the information culture in terms of the metaphors of Davenport *et al.*, (1992) as this may influence the use of technology (Davenport *et al.*, (1992); McKinnon and Bruns, 1992).

6. Future Plans for the Use of the PC

The Theory of Reason Action (Ajzen and Fishbein, 1980) and Behavioural Intentions (Triandis, 1971) suggest that behavioural intentions are strong predictors of future use. The aim here will be to see what future plans the executives have, and especially the novices and end-users Is, as this may provide information about whether or not they are likely to develop their competence.

Q6.1 to 6.6 were designed to explore the executives' future plans and how well formulated they were.

Appendix C - The Executive Interview Guide

1. Sociodemographic Data

1.1 Name

1.2 Organisation

1.3 Age

25 - 30 31 - 35 36 - 40 41 - 45 46 - 50
51 - 55 over 55

1.4 What education and professional qualifications do you have?
(Highest level of education obtained, and membership of professional bodies.)

1.5 Position/Job title
(Where do you position yourself in the organisational structure or organisation chart? Are you a main board level director? If not, how many levels below the board level directors?)

1.6 Responsibilities
(How many other managers report directly to you? How many non-managerial staff report directly to you? Budgets and specific projects for which you are responsible.)

1.7 What is the process for making decisions about the business strategy for your own division/the organisation as a whole?

1.8 What is your role within that process?

1.9 Length of time in current position

1.10 Career path to date
(Brief overview of previous positions in the organisation and other organisations.)

2. Experience with PCs

2.1 Do you use a PC?
(If yes - what type of PC do you use? Is it networked?)

2.2 How easy is it for you to access the PC?
(Location, eg., desk, is it own or shared, time to get to the PC, availability outside the office, eg., home?)

2.3 Where do you use the PC?
(Explore in detail where the PC is used, in office, at home, travelling, in hotels when away from office, in the board room, etc.)

2.4 How long have you been using a PC?

2.5 How often do you use the PC?

Frequency per	day	week	month
Hours per	day	week	month

2.6 What tasks do you use the PC to help you with?

Task	Frequency
Preparing documents/reports	
Financial planning	
Budgeting	
Forecasting	
Analysis	
Presentations	
Communications	
E-mail	
V-mail	
Diary management	
Controlling/allocating resources	
Staff movements	
Managing resources	
Project management	
Networking/Contact Management	
Trying out ideas/prototyping	
Others	

2.7 What sort of software do you use for these applications?
(Probe for what software is used for which application.)

Word processing
Spreadsheets
Graphics
Databases
Diary management/time management
Project management
Other specialist applications

2.8 What influences the choice of software for a specific task?

2.9 How complete are the documents/reports/presentations being prepared?
(How finished are these documents? Who finishes them and distributes them?)

2.10 For a given piece of software, eg., spreadsheets, or database, who normally develops the specific software applications which you use?
(Self, together with someone else, eg., IS professional, another member of the division who may not be an IS professional, outside consultant.)

2.11 Who usually changes the structure of your software applications/reports after development?

2.12 Does anyone else use the software applications you develop?

2.13 If someone else develops your applications, at what stage do you become involved in the development cycle, and to what extent?
(Extent - detailed specification of output, eg., report, to outline of needs; detailed specification of data sources to outline of sources; number of times meet with developer. Who is the more dominant, you or the developer?)

2.14 Who do you feel is the owner of the applications you use?
(You or the developer? Only ask if not obvious from previous questions.)

2.15 How well do you feel the applications developed for you meet your needs?

(1) Very well (2) Well (3) Okay (4) Not well (5) Not at all

(Explore any mismatch, and associated reasons, eg., needs have changed by the time the application is developed.)

2.16 Do you have any responsibility for/influence over the allocation of IT resources within your division/the organisation?

3. Acquisition of Competence with Computers

3.1 If we drew a graph of use of computers versus time, from the first time you used a PC, what would it look like?
('Use Over Time' graph. The factors which influenced the path, eg., peaks and troughs, will be explored through questions 3.2 to 3.8.)

3.2 How did you acquire your current level of expertise with the PC?
(Go back over time from first encounter with a computer.
Formal courses, how many, when, where, mentor, self tuition, format.)

3.3 For formal training, explore the fit to the need.
(How do any IT related courses compare with other sources of training and development, eg., quality and usefulness?)

3.4 What influenced you most to learn to use the PC, and in what way?
(Eg., a specific person, the organisational culture, an event, a course, etc.)
Go back over time. If several factors, rank in order of importance from (1) being the most important, through to that of least importance.
(Explore reasons for ranking.)

3.5 Did you ever feel inhibited/negative about using the PC?
(For example, a specific person, the organisational culture, an event, course, availability of resources. Explore how they inhibited use.) Go back over time. If several factors, rank in order of importance from (1) being the most important, through to that of least importance. (Explore reasons for ranking.)

3.6 At any time did any of these factors ever make you give up completely?

3.7 If yes, what made you start to use the PC again?

3.8 Currently are there any factors which inhibit you from making more extensive use of the PC?
(Resources, support, time, capability of the technology.)

3.9 What sources of training and support do you currently find most useful?
(For example, colleague, reference manual, friend, on-screen help, IT professional, family, eg., children, formal training, self-teaching package.)
Rank in order of helpfulness from (1) being the most helpful, through to that of least help. (Explore reasons for ranking.)

4. Benefits of Using the PC

4.1 What do you see as the benefits to you of using the PC and why?

Benefit	Ranking
Saving time - explore in what way	
Administration	
Routine tasks	
Time to prepare reports	
Communicate	
Obtain information	
More self reliant	
More professional	
Better decision making - explore why and in what way	
Accurate information	
Timely information	
Reliable information	
More information	
More time to try out new ideas	
More able to try out ideas	
Better communications - explore why and in what way, eg., with:	
Peers	
External contacts	
Subordinates	
CEO	
More senior directors	
Improved career prospects	
Freedom/flexibility to work where and when convenient	

Cost savings (for the organisation)
More effective use of organisational resources, eg., manpower
Better use of pa/secretary
Others

4.2 Rank the benefits in order of significance from (1) being the most significant/important through to that of least significance/importance. (Explore reasons for ranking.)

4.3 Have the benefits you obtained changed in order of magnitude and importance with time? (If so, in what way? What caused the changes?)

4.4 Do you feel that using a PC has changed how you approach/do your work?
(For example, ability to do certain tasks which could not hitherto be done by you, relationship with your secretary, constraints imposed by using the PC.)

4.5 Did you expect to gain these benefits or were there some unexpected benefits? (Note any anecdotes.)

4.6 Have you found any unexpected outcomes which might represent downsides to the way you use your PC? (For example, loss of status symbols, health problems, less face to face contact, too much junk e-mail.)

4.7 Rank the downsides in order of significance from (1) being the most significant/important through to that of least significance/importance. (Explore reasons for ranking.)

4.8 Have the downsides changed in order of magnitude/importance with time? (If so, explore in what way and what caused the changes?)

5.0 Organisational Norms

5.1 What is the attitude towards the use of PCs amongst your peers?
(How many of your fellow directors/managers use/own a PC?)

5.2 How does your use compare to theirs?
(More or less extensive in terms of frequency and number of tasks the PC is used to support, and range of applications.)

5.3 Does the CEO/MD use a PC?
(If yes, in what way and how extensively?)

5.4 What use is made of the PC by the managers who report to you?

5.5 Where does the information you use come from?
(Internal sources, external sources, format.)

5.6 How easy is it to obtain this information?
(Freely available, via a gatekeeper, if so who/which department?)

5.7 How much confidence do you place in the accuracy of this information?

6. Future Uses

6.1 Do you feel there are other ways you might use the PC but which you have not yet exploited?
(For example, ways others such as peers are using the PC.)

6.2 What prevents you from using the PC in this way?
(Hardware/software limitations, personal competence, time versus the benefits.)

6.3 What plans do you have for developing these future uses of the PC?
(Specific tasks, activities, software, and time frames.)

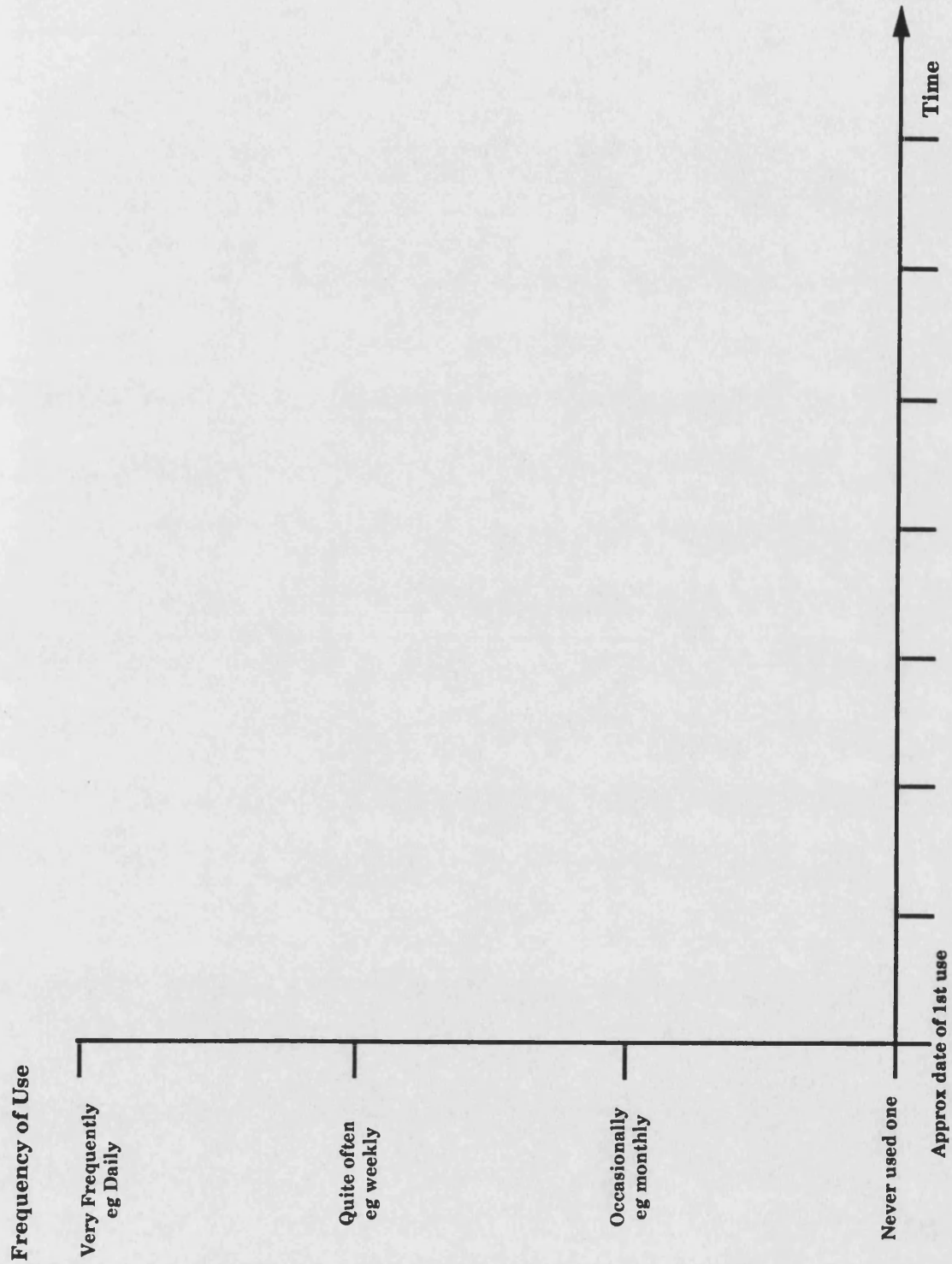
6.4 What benefits do you foresee from using the PC in this way?
(If needed, use prompts from question 4.1.)

6.5 Do you foresee any changes in the way you work resulting from the futures uses of the PC? (If needed, use prompts from question 4.4.)

6.6 Do you foresee any downsides to the planned future uses?

6.7 Any other comments about any aspect of the interview?

Use Over Time Graph - Template



Appendix D - End-User Framework Developed for Sample Selection

As discussed in Chapter 2, there is evidence to suggest that some factors relating to use vary according to the level of expertise, eg., satisfaction with the level of support. Glaser and Strauss (1967, pp. 56-57) posit that on the one hand selecting sub-groups where the differences are maximised is useful in that:

> '... it increases the probability that the researcher will collect different and varied data bearing on a category while yet finding strategic similarities. ... Maximising brings out the widest possible coverage on ranges, continua, degrees, types, uniformities, variations, conditions, consequences, probabilities of relationships, strategies, process, structural mechanisms, and so forth, all necessary for elaboration of the theory' .

Conversely they caution (p. 52) that the sociologist must be careful to:

> 'keep in mind that they (the sub-groups) are an artefact of his research design, and so does not start assuming in his analysis that they have properties possessed by a natural group'.

As wide a range of expertise was sought from non-user to very experienced. In order to help select executives with such diverse PC expertise, a five level end-user framework was developed based on the work of Rainer and Harrison (1993). A brief description is given of each of the proposed levels of user based on the top three of the statements (in loading terms) used by Rainer and Harrison (1993) in their end-user construct.

1. Non-User

An executive who currently makes no direct use whatsoever of the computer. He may make indirect use either through an intermediary such as a secretary or use the output from a computer. However, he makes no personal interactive use of the computer himself. (This is this researcher's definition, based on the overall definition of an end-user given in Section 1.4.3. There is no such definition, in the Rainer and Harrison (1993) framework as they only studied users.)

2. Novice-User

A user who only access information from the PC via menus and in pre-defined formats which have been prepared for them by someone else.

- Cannot change information/reports obtained from their computer without someone's help.
- Always asks for help if wants new/different information/reports from their computer.
- They can only use the computer to look at information that others have prepared for them.

Rainer and Harrison (1993) call this level 'Beginning'.

3. End-User I

A user who can create some simple applications of their own, eg., document or spreadsheet, and can make simple changes (modifications and additions) to the information/ reports they obtained from their PC. Their output (eg., documents and reports) may or may not be complete and ready to distribute. In some cases they will rely on others to top and tail the output before distribution. They will be the only ones who use the applications they develop.

- The extent of their expertise is to create their own reports on their own computer.
- The extent of their knowledge about PCs is to be able to change the information/reports they obtain from their computer.
- The extent of their knowledge about computers is the basic use of software packages such as spreadsheets, databases, word processing, statistics, and graphics/presentation packages.

Rainer and Harrison (1993) call this level 'Intermediate'.

4. End-User II

A more advanced end-user who can access data from different sources, eg., the mainframe, and write more sophisticated applications; otherwise similar to end-user I status.

- They can develop applications using ('more sophisticated packages') such as Lotus macros, SAS, and dBase for their own use.
- They can write programmes in third generation languages for their own use.
- They are the only person who uses the computer applications they develop.

(NB. Later in the inventory Rainer and Harrison indicate that others may use their applications.) Rainer and Harrison (1993) call this level 'Advanced'.

5. Expert User

This user has no professional MIS training, but is nonetheless a very experienced user and will be able to use a wide range of applications and often develop quite complex applications by himself. Sometimes these applications will either be used by others, or used as the prototype for a subsequent departmental application. From time to time the expert end-user may mentor/coach colleagues and peers.

- Even though my job description is not that of an MIS/DP programmer/analyst, my job is to consult with people from my entire organisation about their computer problems.
- Even though my job description is not that of an MIS/DP programmer/analyst, my job is to evaluate and test software for use by people in my entire organisation.
- Even though my job description is not that of an MIS/DP programmer/analyst, I develop applications to help my co-workers in my department access data in databases.

Rainer and Harrison (1993) call this level 'Facilitation'.

Rainer and Harrison (1993) have a further level called 'Infrastructure' which is an MIS professional working within the department, but it was thought unlikely that one would find any executives fulfilling this role, except perhaps an MIS director.

Appendix E - Background Information Interview Guide

1. General Information

1.1 Name

1.2 Organisation FT Top 150 Position

1.3 Turnover

1.4 Number of employees

1.5 Structure of the business
(Eg., how many separate business units and their interrelationships, centrality of service units such as marketing, and finance.)

1.6 Where do the executives to be interviewed fit in the organisation structure?

1.7 Position of interviewee and main role in the organisation

1.8 Involvement in project

1.9 In a few sentences how would you describe the culture of the organisation?
(Eg., what is valued, on what basis are people appraised: grade/ position, or achievements, long service, political actions? What are the underlying beliefs of the senior executives? Is the business constantly changing, very stable, etc?)

1.10 What is the most popular (frequently recounted) myth relating to the history of the organisation?
(Have things changed over time with respect to this, and, if so, how?)

1.11 Are there any special terms used in the organisation which only insiders understand?

1.12 What kind of people are most likely to advance quickly in their careers in the organisation?

1.13 What things do people very much like to see happening here?

1.14 What is the biggest mistake anyone can make in this organisation?

2. Business Strategy/Policy

2.1 What is the mission statement for the organisation?

2.2 What are the main strategies for achieving the mission?
(For example, organic growth, external acquisitions, cost cutting, customer focus, developing new products, being first in or a follower.)

3. Human Resource Policy and Strategy

3.1 What is the strategy/policy for management training and development as a whole?
(Eg., sequence of course which managers go through as part of their development, number of days of development given to all managers, etc.)

3.2 Within this strategy, where does IT training and education fit?

3.3 Is there a strategy/framework for IT training?
(Is there a defined learning path, are courses structured, how often are they provided, are they proactive or reactive to needs?)

3.4 How are training needs assessed in general, and is it the same for IT?
(When, by whom, how, is there a link to preferred learning styles?)

3.5 Who designs and gives the IT training?
(For example, IS, training internal, external sources, and method of selecting source.)

3.6 What delivery methods are primarily used?

3.7 How does the IT training compare to training in other areas of personal effectiveness such as finance?
(Same or different, and if different in what ways, eg., priority and emphasis, formulation of plans, structure of courses, source of courses, quality, quantity, delivery methods.)

4. IT Policy and Strategy

4.1 Is there a formal policy for IT which defines the mission and strategy for IT? If yes, give brief outline.
(Architecture, software and hardware standards.)

4.2 Is there a specific policy for personal computers?
(Who has one, what type, what make, software, etc?)

4.3 Who defines the policy/strategy, and how often is it reviewed?

4.4 How much freedom do individuals and individual business units have to make their own decisions about IT, especially choice of hardware and software?

4.5 What is the procedure which must be gone through by individuals and in particular senior executives who want to acquire IT?
(Eg., cost justification, upper and lower limits, phone request.)

4.6 To whom do the professional IT support staff report?

4.7 Where are the IT support staff located?
(Centralised unit, dispersed within in business units, a mix.)

4.8 What level of ongoing support is available, and how it is accessed?
(Information centre, help desk, formal request, phone.)

4.9 What are the five most dominant factors driving the use of IT within the organisation? Rank in order of importance, from (1) as the most important to the least important.

4.10 Are there any factors which restrain the use of IT within the organisation?
(If yes, list and rank as before.)

4.11 Do you see those barriers being overcome in the near future?
(If so why, how and when?)

4.12 On what basis are IT resources allocated to projects?
(Who is involved and, what criteria are used to make the decision, eg., cost benefit? Is this the same for new and on going projects?)

4.13 What are the procedures for developing an application, particularly for a senior executive?
(How and at what stages is the SE involved, eg., specification, testing?)

4.14 Once an application is developed who owns that application?

4.15 How is that application supported after development?
(Is there any formal documentation on how to use it?)

5. Information Culture

5.1 Is information seen as either a corporate resource or asset?

5.2 Do some see information as their personal property?

5.3 How freely does information flow around the organisation?

5.4 Do some people have greater access to information than others?
(What is the basis for greater access?)

5.5 Who/what primarily controls the flow of information?
(The CEO, the technology, the IT department, the department providing the information, eg., marketing, the person providing the information.)

6. Notes about Interviewees

Extent of use of PCs, attitude to IT, hot buttons, commitment to participating in the study